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Forest Service

Region One

BR
REPORTS
Annual - 1956

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WHITE PINE BLISTER RUST CONTROL

Calendar Year 1956

UNITED STATES DEPARTMENT OF AGRICULTURE

Forest Service

Region One

BR
REPORTS
Annual - 1956

WHITE PINE BLISTER RUST CONTROL

Calendar Year 1956

This report was prepared from information submitted by the several forests and under the direction of the Chief of the Division of Blister Rust Control in Region One.

H. E. Swanson

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Forest Service

Region One

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WHITE PINE BLISTER RUST CONTROL

I. Summary of All Programs

1. Highlights of the 1956 Blister Rust Control Program

Introduction. This annual report is organized differently than in previous years. By a few additions to the National Forest and the State and Private sections, it was possible to omit the separate forest reports and still retain the important data identified by forests.

Objectives. As in previous years, the U. S. Forest Service, under cooperative arrangements with the National Park Service Region II and with the Forestry Department of the State of Idaho and the North Idaho Timber Protective Associations, provided the leadership and technical direction for blister rust control on lands of all ownerships. The over-all objectives under the three programs are the protection of white pine on the following acreages:

Program	National Forest Acres	National Park Acres	Public Domain Acres	State Acres	Private Acres	Total Acres
National Forest	804,150	-	7,300	24,260	69,630	905,340
National Park	-	48,910	-	-	-	48,910
Idaho State & Private	23,090	-	-	62,250	95,020	180,360
Totals	827,240	48,910	7,300	86,510	164,650	1,134,610

Cooperators. The following agencies cooperated actively in the control program:

U. S. Forest Service
National Park Service
State of Idaho
Clearwater Timber Protective Association
Potlatch Timber Protective Association
Priest Lake Timber Protective Association

Progress. Blister rust control crews in 1956 worked 53,410 acres. This was the first time since 1953 that ground covered exceeded 50,000 acres. The increase was due primarily to increases in federal, state, and private funds.

Expansion in National Park Control Area. The National Park Service has approved a 22,070-acre expansion in control area in Region II involving Glacier, Yellowstone, and Grand Teton. No area in Grand Teton had been included in the control program up to this time.

Breeding Western White Pine Resistant To Blister Rust. Results of eight years' work have proved that a useful degree of rust resistance can be obtained in some young first generation progenies from resistant parents. An expansion of this rust resistant tree breeding project is underway to provide 20 million rust resistant white pine seed annually by 1980 if the F₁ progeny prove satisfactory or by 1990 if F₂ progeny must be used.

Chemical Ribes Eradication. A special scarifier attached to the end of the spray nozzle is getting a more effective crown and soil drench, resulting in a more complete ribes kill. The scarification of the basal stems provides evidence for inspectors that the ribes were treated. Wood flour, mixed with spray solution, is providing a good over-all marker.

Chemical Treatment of Excised Trunk Cankers. Actidione, a fungicide, has given good results in killing excised trunk cankers. This may prove to be a useful method of saving infected crop trees or highly prized ornamentals.

Spread of the Rust. Blister rust was found on white pine for the first time in Grand Teton National Park in 1956, representing a considerable southeastern extension of known pine infection. Rust was found for the second time on ribes (first in 1952) in the vicinity of Laramie, Wyoming, indicating a probable buildup of rust in this direction.

2. Blister Rust Control Expenditures, Calendar Year 1956

State	U. S. Forest Service Region One					National Park Service	State and Private	Totals
	712	042	432	K-V	Total			
Idaho	\$ 99,450	\$711,148	\$103,124	\$23,799	\$ 937,521	\$ -	\$90,250	\$1,027,771
Mont.	15,364	57,537	-	-	72,901	15,033	-	87,934
Wash.	14,325	144,596	-	2,200	161,121	-	-	161,121
Colo.	2,453	-	-	-	2,453	13,447	-	15,900
Wyo.	7,762	-	-	-	7,762	34,464	-	42,226
Total	\$139,354	\$913,281	\$103,124	\$25,999	\$1,181,758	\$62,944	\$90,250	\$1,334,952

712 - Leadership and technical direction for all programs

042 - National forest program

432 - Federal funds for state and private program

K-V - Stand improvement collections used for BRC on national forest lands

3. Field Organization, 1956

Program	Camps	Employees	Contractors
National Forest	28	815	20
National Park	5	60	-
State and Private	8	290	4
Totals	41	1,165	24

4. Total Progress on Ribes Eradication in 1956

Program	Working	Regular Work Acres	Checker Flanker Acres	Total Worked Acres	Man Days	Ribes	Per Acre	
							Man Days	Ribes
National Forest	Initial	3,040	80	3,120	3,810	1,238,300	1.22	397
	Rework	23,040	5,480	28,520	27,100	782,800	.95	27
	Maintenance	6,560	2,800	9,360	3,420	31,100	.37	3
	Totals	32,640	8,360	41,000	34,330	2,052,200	.84	50
State & Private	Initial	1,770	-	1,770	2,450	2,445,900	1.38	1,382
	Rework	5,220	490	5,710	7,120	188,500	1.25	33
	Maintenance	860	-	860	400	3,400	.47	4
	Totals	7,850	490	8,340	9,970	2,637,800	1.20	316
National Parks	Initial	1,180	-	1,180	1,190	220,300	1.01	187
	Rework	1,670	780	2,450	1,230	145,640	.50	59
	Maintenance	200	240	440	100	1,760	.23	4
	Totals	3,050	1,020	4,070	2,520	367,700	.62	90
All Programs	Initial	5,990	80	6,070	7,450	3,904,500	1.23	643
	Rework	29,930	6,750	36,680	35,450	1,116,940	.97	30
	Maintenance	7,620	3,040	10,660	3,920	36,260	.37	3
	Totals	43,540	9,870	53,410	46,820	5,057,700	.88	95

Note: Number of acres in National Forest Program worked with K-V funds: 1,798.

5. Chemical Eradication in 1956

Program	Acres	Man Days	Ribes	Gallons
National Forest	2,057	2,887	1,412,100	392,690
State and Private	430	930	2,332,000	132,750
National Parks	690	1,100	308,030	26,340
Totals	3,177	4,917	4,052,130	551,780

6. Contract Ribes Eradication in 1956

Program	Number of Contracts	Acres	Man Days	Ribes	Dollars
National Forest	33	1,911	1,973	42,280	\$29,293
State and Private	2	140	100	1,000	1,530
Totals	35	2,051	2,073	43,280	30,823

7. Summary of Control Status by Age Classes

Program	Stand Origin	Total Acres	Unworked Acres	Needing Rework Acres	Needing Post Check Acres	On Maintenance Acres
National Forest	1941-1960	38,130	6,070	11,080	11,990	8,990
	1921-1940	194,240	29,800	32,540	53,980	77,920
	1881-1920	265,370	42,830	41,040	71,290	110,210
	1841-1880	44,300	17,120	2,020	12,770	12,390
	Before 1841	356,990	148,700	53,780	100,100	54,410
	Nonforest	<u>6,310</u>	<u>-</u>	<u>170</u>	<u>510</u>	<u>5,570</u>
	Totals	905,340	244,520	140,630	250,700	269,490
State and Private	1941-1960	33,830	22,500	5,050	6,040	240
	1921-1940	68,630	5,180	18,140	18,230	27,080
	1881-1920	39,050	670	4,800	15,170	18,410
	1841-1880	4,160	970	-	90	3,100
	Before 1841	34,220	6,040	8,650	6,920	12,610
	Nonforest	<u>470</u>	<u>-</u>	<u>-</u>	<u>20</u>	<u>450</u>
	Totals	180,360	35,360	36,640	46,470	61,890
National Parks		48,910	22,910	4,470	2,580	18,950
Grand Totals		1,134,610	302,790	181,740	299,750	350,330



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Mature western white pine on Goose Creek, Kaniksu National Forest.

Tree diameters and log lengths: (1) 46" d.b.h., 10 logs; (2) 36", 9 logs; (3) 40", 10 logs; (4) 32", 10 logs; (5) 32", 10 logs; (6) 40", 10 logs; (7) 42", 8 logs Cedar.



Second growth western white pine 15 years after thinning, Bearpaw Creek. Commercial thinning made in 1940. An even-aged stand on Class 1 site 65 years of age when cut. Average volume per acre 21.4 M bd. ft. of white pine Scribner Dec C log scale in trees 10" d.b.h. and larger; 32.4% of trees and 40.6% by volume removed. Slash disposal by progressive burning in piles. Crop trees pruned for 16-ft. log.

II. National Forest Program

1. Highlights of the 1956 Season

Progress. Ground covered in 1956 was 41,000 acres, an increase of 2,140 over 1955. With two years' work completed under the second five-year plan (1955-1959), progress has been keeping up reasonably well with objectives. Acres worked in the two-year period were 79,860, representing 95 percent of the planned work. Effective man days employed were 64,350, representing 93 percent of the estimated requirement. Dollars expended totalled \$1,940,545, representing 97 percent of the estimated need. These comparisons reflect a slightly greater accomplishment per man day of work and somewhat fewer man days per dollar expended. Rising materials and labor costs account for the latter difference. Studies are being made in organization and financial management to reduce the cost of an effective man day.

Control Status. In 1956, 16,300 acres went on maintenance, which means control was established. Maintenance acres total 269,490, representing 30 percent of the control area.

Clearwater. The general project organization during the field season followed the same lines as last year. On October 6, 1956, Donald F. Williams, assistant project officer, was transferred to the Kootenai National Forest. The program was slightly larger than in the past few years. Work was continued in the excellent immature stands and needed work on partial cut areas is on schedule.

Total white pine blister rust control area on the Clearwater was reduced by 19,190 acres. This was the result of further analysis of some of the lowest priority units, including Unit 22, Cove-Knute, and Unit 23, Lodge-Tumble.

All areas worked met maintenance standards. Full use was made of chemical wherever feasible. All presently scheduled eradication was completed in partial cut areas in Tepee and Lolo-Musselshell with K-V funds. This includes areas where cedar pole operations interfered last season. The checker-flanker method was used to complete all needed rework in Deadwood and Independence units. Work in Fan Creek and in the Alder-Beaver area will be completed next season. (M. C. Riley)

St. Joe. Effective August 1, 1956, David A. Graham replaced John D. Sandmeyer as unit supervisor in charge of five BRC camps. Mr. Sandmeyer was assigned to the Roundtop Ranger District, Avery, Idaho, as forester in charge of slash disposal.

An analysis of a stocking and disease survey performed on the Marble-Bussel units (81, 84, 85) during the fall of 1955 has resulted in the elimination of these units from the National Forest Program. The high percent of damaged white pine (80.5%) and the low percent of remaining healthy white pine stocking (5.9%) was instrumental in arriving at the decision to drop these units.

The blister rust control organization is cooperating with timber management in planning and supervising sales designed to salvage young white pine stands damaged by blister rust and pole blight. A small sale of damaged white pine was successfully administered during the spring of 1956 near Clarkia, Idaho. Additional sales are planned in this area.

Blister rust control workers were required to spend 763 man days on fire suppression work during the 1956 field season. (C. J. Miller)

Kaniksu. Due to improved eradication methods, quality of labor, and reduced turnover, ribes eradication was accomplished on more acres in 1956 than in any previous year since 1947.

Objectives for the second year of the five-year program 1955-1959 were exceeded. The costly and difficult spraying of the protection zone at the head of Kalispell Creek basin was completed this year. Also, the heavy hand eradication on East Plowboy Mountain in the Beaver Creek unit was finished. Ribes populations were reduced to a maintenance basis on 14,000 acres or 69 percent of the total area eradicated this year. The percentage of maintenance in stabilized reproduction and pole stands is nearly 80 percent.

Contracting accomplishments increased 10 percent in acreage and 55 percent in man days expended over the 1955 program.

Use of K-V funds, while less than in 1955, will expand in future years. In 1957, a 30-man camp in Blacktail Creek will be financed entirely from K-V funds.

Preliminary surveys in tributaries of the Pend Oreille River in Washington indicate that several predominantly pole areas should be included in the control program.

A field test in the chemical treatment of infected white pine with actidione was established after the close of the field season. The purpose was to train overhead personnel in its use and determine methods of crew application. Canker elimination by chemical methods offers much promise in reducing rust losses and preserving adequate stocking of white pine in young stands. (H. J. Viche)

Coeur d'Alene. Blister rust control activities on the Coeur d'Alene National Forest got off to a good start at the beginning of the 1956 field season. Seasonal employees arrived on schedule, were capable and well trained. However, during the time when crews were at their highest production, the drain and interruption resulting from fire suppression was serious. A total of 1,287 man days were spent on fire suppression or related activities.

During the fall months 1,025 acres of cutover area were broadcast burned. Approximately 1,000 acres are scheduled for similar treatment during the fall of 1957. These areas are all within active blister rust control units. Ribes will be destroyed by chemical ribes eradication methods prior to the planting of white pine. Blister rust control work on these areas will be financed primarily from K-V funds.

Effective December 30, 1956, Fred J. Heinrich was transferred to the Regional Office, Missoula, Montana. Harry J. Faulkner was transferred from the Kaniksu National Forest to fill the position of staff officer, blister rust control, on the Coeur d'Alene National Forest.

Effective March 9, 1956, William Fredeking returned from Military Furlough and was assigned to the blister rust control project. (F. J. Heinrich)

Kootenai. Major increases in chemical power spray activities occurred during the 1956 field season. Future chemical workload increases are resulting from the extensive salvage logging of beetle-damaged spruce stands within the protective zones of white pine blister rust control units. The freer movement of air currents downhill following the loss of screening when large blocks of spruce are removed may make wider protective zones necessary.

The South Fork of Meadow Creek, Unit 3-A, was dropped from the control plan this year. An extensive Pine Disease and Stocking Survey Program is planned to re-appraise units under control and to evaluate some additional white pine blocks on the forest.

Changes in the BRC staff assignment have been frequent in 1956. Gustav A. Verdal replaced John P. Bushfield in mid-March when the latter became timber management assistant on the Troy Ranger District. In October, Donald F. Williams became the third staffman in this calendar year when he succeeded Verdal, who became ranger on the Rexford District.

2. Expenditures, Calendar Year 1956

Forest	712 Funds	042 Funds	K-V Funds	Totals
Clearwater*	\$ 9,507	\$150,307	\$ 8,004	\$167,818
St. Joe*	11,241	256,587	-	267,828
Kaniksu*	22,900	300,400	8,900	332,200
Coeur d'Alene	13,800	113,954	9,095	136,849
Kootenai	5,057	52,437	-	57,494
Totals	\$62,505	\$873,685	\$25,999	\$962,189

*Also had cooperative program on state and private lands.

3. Organization, 1956

Forest	Camps	Employees	Contractors
Clearwater	4	150	-
St. Joe	6	230	1
Kaniksu	10	260	13
Coeur d'Alene	5	130	6
Kootenai	3	45	-
Totals	28	815	20

4. Ownership in National Forest Units

Forest	National Forest Acres	Public Domain Acres	State Acres	Private Acres	Total Acres
Clearwater	166,320	1,700	3,090	7,740	178,850
St. Joe	72,400	5,600	12,000	25,700	115,700
Kaniksu	202,930	-	4,770	24,230	231,930
Coeur d'Alene	265,500	-	4,400	10,700	280,600
Kootenai	97,000	-	-	1,260	98,260
Totals	804,150	7,300	24,260	69,630	905,340

5. Total Progress on Ribes Eradication in 1956

Forest	Working	Regular Work Acres	Checker Flanker Acres	Total Worked Acres	Man Days	Ribes	Per Acre	
							Man Days	Ribes
Clearwater	Initial	1,120	-	1,120	920	203,000	.82	181
	Rework	<u>2,720</u>	<u>1,150</u>	<u>3,870</u>	<u>5,530</u>	<u>61,000</u>	<u>1.43</u>	<u>16</u>
	Totals	3,840	1,150	4,990	6,450	264,000	1.29	53
St. Joe	Initial	110	-	110	510	689,400	4.64	6,267
	Rework	5,380	-	5,380	6,760	54,700	1.26	10
	Maintenance	<u>4,430</u>	<u>-</u>	<u>4,430</u>	<u>1,860</u>	<u>22,100</u>	<u>.42</u>	<u>5</u>
	Totals	9,920	-	9,920	9,130	766,200	.92	77
Kaniksu	Initial	1,450	80	1,530	1,490	282,000	.97	184
	Rework	11,890	3,910	15,800	9,690	362,000	.61	23
	Maintenance	<u>620</u>	<u>2,110</u>	<u>2,730</u>	<u>400</u>	<u>2,000</u>	<u>.15</u>	<u>1</u>
	Totals	13,960	6,100	20,060	11,580	646,000	.58	32
Coeur d'Alene	Initial	340	-	340	860	29,900	2.53	88
	Rework	1,830	100	1,930	3,430	83,100	1.78	43
	Maintenance	<u>1,170</u>	<u>310</u>	<u>1,480</u>	<u>960</u>	<u>3,000</u>	<u>.65</u>	<u>2</u>
	Totals	3,340	410	3,750	5,250	116,000	1.40	31
Kootenai	Initial	20	-	20	30	34,000	1.50	1,700
	Rework	1,220	320	1,540	1,690	222,000	1.10	144
	Maintenance	<u>340</u>	<u>380</u>	<u>720</u>	<u>200</u>	<u>4,000</u>	<u>.28</u>	<u>6</u>
	Totals	1,580	700	2,280	1,920	260,000	.84	114
All Forests	Initial	3,040	80	3,120	3,810	1,238,300	1.22	397
	Rework	23,040	5,480	28,520	27,100	782,800	.95	27
	Maintenance	<u>6,560</u>	<u>2,800</u>	<u>9,360</u>	<u>3,420</u>	<u>31,100</u>	<u>.37</u>	<u>3</u>
	Totals	32,640	8,360	41,000	34,330	2,052,200	.84	50

6. Summary of Control Status by Age Classes

Forest	Stand Origin	Total Acres	Unworked Acres	Needing Rework Acres	Needing Post Check Acres	On Maintenance Acres
Clearwater	1941-1960	12,890	2,860	5,750	2,880	1,400
	1921-1940	15,790	6,190	3,260	3,280	3,060
	1881-1920	38,350	18,130	6,010	4,550	9,660
	1841-1880	11,860	6,480	650	2,860	1,890
	Before 1841	<u>99,960</u>	<u>52,790</u>	<u>7,540</u>	<u>25,770</u>	<u>13,860</u>
	Totals	178,850	86,430	23,210	39,340	29,870
St. Joe	1941-1960	4,100	900	1,400	1,800	-
	1921-1940	55,600	300	11,500	12,100	31,700
	1881-1920	53,300	200	15,400	21,300	16,400
	Before 1841	<u>2,700</u>	<u>-</u>	<u>2,200</u>	<u>500</u>	<u>-</u>
	Totals	115,700	1,400	30,500	35,700	48,100
Kaniksu	1941-1960	13,820	810	2,530	3,490	6,990
	1921-1940	58,160	5,210	10,750	15,380	26,820
	1881-1920	90,280	3,950	9,210	23,890	53,230
	1841-1880	9,590	3,110	570	1,610	4,300
	Before 1841	53,770	7,330	7,080	24,100	15,260
	Nonforest	<u>6,310</u>	<u>-</u>	<u>170</u>	<u>570</u>	<u>5,570</u>
	Totals	231,930	20,410	30,310	69,040	112,170
Coeur d'Alene	1941-1960	6,900	1,300	1,400	3,600	600
	1921-1940	61,000	18,100	6,800	21,400	14,700
	1881-1920	41,100	5,300	8,300	17,600	9,900
	1841-1880	17,300	2,000	800	8,300	6,200
	Before 1841	<u>154,300</u>	<u>60,100</u>	<u>34,900</u>	<u>45,900</u>	<u>13,400</u>
	Totals	280,600	86,800	52,200	96,800	44,800
Kootenai	1941-1960	420	200	-	220	-
	1921-1940	3,690	-	230	1,820	1,640
	1881-1920	42,340	15,250	2,120	3,950	21,020
	1841-1880	5,550	5,550	-	-	-
	Before 1841	<u>46,260</u>	<u>28,480</u>	<u>2,060</u>	<u>3,830</u>	<u>11,890</u>
	Totals	98,260	49,480	4,410	9,820	34,550
All Forests	1941-1960	38,130	6,070	11,080	11,990	8,990
	1921-1940	194,240	29,800	32,540	53,980	77,920
	1881-1920	265,370	42,830	41,040	71,290	110,210
	1841-1880	44,300	17,120	2,020	12,770	12,390
	Before 1841	356,990	148,700	53,780	100,100	54,410
	Nonforest	<u>6,310</u>	<u>-</u>	<u>170</u>	<u>570</u>	<u>5,570</u>
	Totals	905,340	244,520	140,630	250,700	269,490



Western white pine plantation - Cuban Hill. Planted 1932; picture, 1943.



Cuban Hill plantation 12 years later (1955).

III. State and Private Program

1. Highlights of the 1956 Season

Progress. Ground covered in 1956 was 8,340 acres, an increase of 2,240 over 1955. The increase was a direct result of a full season's operation on a higher level of financing from both federal and state sources. Accomplishments in the first two years of the current five-year work plan (1955-1959) have been satisfactory. Plans had to be revised somewhat as a result of certain relogging activities and also as a result of the underfinancing in 1955. A comparison of accomplishments with original objectives in the two-year period shows the 14,440 acres worked to be 92 percent of the planned objective, the 16,290 effective man days employed was 8 percent over that estimated, and the expenditure of \$357,588 was 96 percent of the estimated cost.

Control Status. In 1956, 2,370 acres went on maintenance (control established). Maintenance acres total 61,890 representing about one-third of the control area.

Clearwater Timber Protective Association. Satisfactory results are being obtained in State and Private units considering present inadequate financing. Work is on schedule in the Pierce and Jaype areas. Very little remains to be done in the Deer Creek drainages and in the vicinity of Headquarters. This will be completed early next season, which will permit acceleration of the work in Washington Creek. (M. C. Riley)

Potlatch Timber Protective Association. Logging activity has increased on many partially cut areas within the State and Private blister rust control units. The present demand for pulp material is resulting in the removal of residual stands of grand fir, hemlock and cedar from these areas. (C. J. Miller)

Priest Lake Timber Protective Association. Two camps were operated in State and Private units. These camps in Ruby Creek and Hellroaring Creek units were financed equally from federal BRC funds and federal cooperative and State and private funds. Expenditures on State and Private units were increased 25 percent over 1955 with a corresponding increase in accomplishments. (H. J. Viche)

2. Expenditures, Calendar Year 1956

Timber Protective Association	Federal Funds			State and Private Funds			Total All Funds
	712	432	Total	State	Private	Total	
Clearwater T.P.A.	\$ 7,092	\$ 42,263	\$ 49,355	\$28,741	\$10,474	\$39,215	\$ 88,570
Potlatch T.P.A.	2,810	47,461	50,271	24,835	8,500	33,335	83,606
Priest Lake T.P.A.	2,000	13,400	15,400	7,213	10,487	17,700	33,100
Totals	\$11,902	\$103,124	\$115,026	\$60,789	\$29,461	\$90,250	\$205,276

712 - Leadership funds

432 - Cooperative Control funds

3. Field Organization, 1956

Association	Camps	Employees	Contractors
Clearwater T.P.A.	3	120	-
Potlatch T.P.A.	3	110	-
Priest Lake T.P.A.	2	60	4
Totals	8	290	4

4. Ownership in State and Private Units

Association	State Acres	Private Acres	National Forest Acres	Total Acres
Clearwater T.P.A.	15,440	51,140	3,380	69,960
Potlatch T.P.A.	16,900	36,500	12,900	66,300
Priest Lake T.P.A.	29,910	7,380	6,810	44,100
Totals	62,250	95,020	23,090	180,360

5. Total Progress on Ribes Eradication in 1956

Association	Working	Regular	Checker	Total	Man Days	Ribes	Per Acre	
		Work Acres	Flanker Acres	Worked Acres			Man Days	Ribes
Clearwater	Initial	260	-	260	370	20,000	1.42	77
	Rework	<u>2,310</u>	<u>-</u>	<u>2,310</u>	<u>3,890</u>	<u>126,000</u>	<u>1.68</u>	<u>55</u>
	Totals	2,570	-	2,570	4,260	146,000	1.66	57
Potlatch	Initial	1,270	-	1,270	1,650	2,405,400	1.30	1,894
	Rework	1,710	-	1,710	2,340	46,500	1.37	27
	Maintenance	<u>600</u>	<u>-</u>	<u>600</u>	<u>380</u>	<u>2,400</u>	<u>.63</u>	<u>4</u>
	Totals	3,580	-	3,580	4,370	2,454,300	1.22	686
Priest Lake	Initial	240	-	240	430	20,500	1.79	85
	Rework	1,200	490	1,690	890	16,000	.53	9
	Maintenance	<u>260</u>	<u>-</u>	<u>260</u>	<u>20</u>	<u>1,000</u>	<u>.08</u>	<u>4</u>
	Totals	1,700	490	2,190	1,340	37,500	.61	17
All Associations	Initial	1,770	-	1,770	2,450	2,445,900	1.38	1,382
	Rework	5,220	490	5,710	7,120	188,500	1.25	33
	Maintenance	<u>860</u>	<u>-</u>	<u>860</u>	<u>400</u>	<u>3,400</u>	<u>.47</u>	<u>4</u>
	Totals	7,850	490	8,340	9,970	2,637,800	1.20	316

6. Summary of Control Status by Age Classes

Association	Stand Origin	Total Acres	Unworked Acres	Needing Rework Acres	Needing Post Check Acres	On Maintenance Acres
Clearwater T.P.A.	1941-1960	17,490	14,560	1,400	1,530	-
	1921-1940	28,190	4,980	8,000	8,200	7,010
	1881-1920	5,200	50	1,760	1,840	1,550
	1841-1880	3,050	-	-	-	3,050
	Before 1841	16,030	1,970	1,890	3,240	8,930
	Totals	69,960	21,560	13,050	14,810	20,540
Potlatch T.P.A.	1941-1960	15,300	7,900	3,500	3,700	200
	1921-1940	28,300	200	7,300	6,400	14,400
	1881-1920	14,900	-	1,900	5,200	7,800
	Before 1841	7,800	1,400	6,000	400	-
	Totals	66,300	9,500	18,700	15,700	22,400
Priest Lake T.P.A.	1941-1960	1,040	40	150	810	40
	1921-1940	12,140	-	2,840	3,630	5,670
	1881-1920	18,950	620	1,140	8,130	9,060
	1841-1880	1,110	970	-	90	50
	Before 1841	10,390	2,670	760	3,280	3,680
	Nonforest	470	-	-	20	450
	Totals	44,100	4,300	4,890	15,960	18,950
All Associations	1941-1960	33,830	22,500	5,050	6,040	240
	1921-1940	68,630	5,180	18,140	18,230	27,080
	1881-1920	39,050	670	4,800	15,170	18,410
	1841-1880	4,160	970	-	90	3,100
	Before 1841	34,220	6,040	8,650	6,920	12,610
	Nonforest	470	-	-	20	450
	Totals	180,360	35,360	36,640	46,470	61,890

IV. National Park Program

I. Highlights of the 1956 Season

The 1956 objectives of the National Park Service Region II white pine blister rust control program were accomplished. The program was planned and conducted as in previous years according to the cooperative arrangements between the National Park Service and the U. S. Forest Service.

National Park Service personnel participating:

Glacier : Elmer Fladmark, chief ranger
*A. D. Cannavina, supervisory park ranger
Paul Webb, district ranger

Yellowstone : Otto Brown, chief ranger
*H. O. Edwards, assistant chief ranger

Rocky Mountain: Harry During, chief ranger
*Merle Stitt, staff ranger

Grand Teton : *Ernest K. Field, chief ranger

Maynard Barrows, National Park Service consulting forester

U. S. Forest Service representatives:

*John C. Gynn, forester
C. M. Chapman, forester

*In charge

The National Park Service Director approves new areas for control. In January 1956, John C. Gynn met with National Park Service Region II Director Howard W. Baker, Regional Forester Frank W. Childs, Forester Maynard Barrows, and other members of their staff at Omaha, Nebraska, to review the results of the 1955 white pine and ribes survey on 27,270 acres of National Park lands. The group determined the following areas should be included in the program and the areas were later approved by the Director of the National Park Service.

Glacier - expanded protection zones to present control areas only.

	<u>Unit</u>	<u>Acres</u>
	Park Headquarters	300
	East Glacier (Rising Sun Campground)	370
	Two Medicine	<u>200</u>
	Total	870
<u>Yellowstone</u>	<u>New Unit</u>	
	Antelope Creek	1,390
	Canyon	11,470
	Fishing Bridge	2,090
	Craig Pass (extension)	<u>5,240</u>
	Total	20,190
<u>Grand Teton</u>	<u>New Unit</u>	
	Snake River (Deadman's Bar)	1,010
	Grand Total	22,070

New areas surveyed at Rocky Mountain. At the request of Superintendent James V. Lloyd, Rocky Mountain National Park, a white pine ribes survey was completed on 4,050 acres, including the north portion of Windy Gulch and the entire adjacent Hidden Valley ski development area. The survey data will be compiled, cost estimates made, feasibility of control determined, and recommendations made for his consideration. Inspections and a few survey strips showed that control could not be economically justified in the Twin Sisters area due to the small amount of National Park land involved.

Disease found at Grand Teton. For the first time white pine blister rust (Cronartium ribicola) was discovered in the park. A fruiting canker of 1949-50 origin was found on limber pine (Pinus flexilis) adjacent to the newly approved control area surrounding the Deadman's Bar vista point. This find indicates the disease is established and can be expected to appear in the stands of the more susceptible species white bark pine (P. albicaulis) existing at higher elevations on the east slope of the Teton Range.

The disease is spreading toward Colorado. Blister rust was again found on the gooseberry hosts (Ribes setosum) near Laramie, Wyoming. This indicates the rust may be intensifying in this vicinity and spreading into southeastern Wyoming toward the Rocky Mountain area.

Training increases production. An intensive preseason training school in the use of portable power spraying equipment was held at Yellowstone for all BRC overhead. Immediately following the arrival of the crewmen, thorough training in all phases of the work was conducted. Moving pictures, charts, slide lectures, and field demonstration and practice were employed. Evening classes in

personnel management, crew organization, work efficiency, and production increase were held for prospective supervisors and leadmen. U. S. Forest Service, Region One, Training Officer Victor O. Sandberg and Assistant Park Superintendent Warren F. Hamilton attended the school. Their contributions helped to implant a feeling of "the importance of the work" in the men. An increase of 22.7 percent in production per effective man day in 1956 can be attributed in large part to the preseason and follow-through training programs.

II. Field Program, 1956

Ribes eradication was performed in Glacier, Yellowstone, and Rocky Mountain. Additional inspections for planning ribes eradication work were made at Grand Teton.

Extended protection zone work started at Glacier. Initial work was started on a buffer strip parallel and immediately adjacent to the west boundary of the East Glacier (Rising Sun campground) control unit.

Initial work was completed on Mt. Washburn extension and several portions particularly hazardous for rust invasion were reworked.

Seedling areas stabilizing at Rocky. Inspections and checking surveys show ribes seed germination in stream and subalpine types to be rapidly diminishing. Only a few man days were required to bring 540 acres of questionable area to maintenance standards.

1. Expenditures, Calendar Year 1956

National Park	National Park BRC	Forest Service Leadership and Technical Direction	Totals
Glacier	\$15,033	\$2,707	\$17,740
Yellowstone	34,464	4,962	39,426
Rocky Mountain	13,447	1,353	14,800
Totals	\$62,944	\$9,022	\$71,966

2. Organization, 1956

Camp superintendents and checkers well experienced in National Park Service blister rust control work were available for all parks in 1956. Batching and Government-subsisted pack camps were used. The 1956 field force was as follows:

National Park	Camps	Employees
Glacier	2	13
Yellowstone	2	32
Rocky Mountain	1	15
Totals	5	60

3. Total Progress on Ribes Eradication in 1956

Work progress and efficiency improved in 1956. The increase is significant considering training was interrupted at Rocky and work was halted several times at Yellowstone by forest fire suppression, searching for lost persons, and inclement weather.

Park	Working	Regular	Checker	Total	Man Days	Ribes	Per Acre	
		Work Acres	Flanker Acres	Worked Acres			Man	Ribes
Glacier	Initial	110	-	110	140	18,700	1.27	170
	Rework	370	90	460	440	9,600	.96	21
	Maintenance	30	-	30	30	600	1.00	20
	Totals	510	90	600	610	28,900	1.02	48
Yellowstone	Initial	460	-	460	570	176,400	1.24	383
	Rework	1,040	300	1,340	650	131,240	.49	98
	Maintenance	150	160	310	50	960	.16	3
	Totals	1,650	460	2,110	1,270	308,600	.60	146
Rocky Mountain	Initial	610	-	610	480	25,200	.79	41
	Rework	260	390	650	140	4,800	.22	7
	Maintenance	20	80	100	20	200	.20	2
	Totals	890	470	1,360	640	30,200	.47	22
All Parks	Initial	1,180	-	1,180	1,190	220,300	1.01	187
	Rework	1,670	780	2,450	1,230	145,640	.50	59
	Maintenance	200	240	440	100	1,760	.23	4
	Totals	3,050	1,020	4,070	2,520	367,700	.62	90

4. Chemical Ribes Eradication, 1956

Manual and portable power spraying methods were extensively used. Delays caused by mechanical failure were negligible. Power spray leadmen showed considerable ingenuity in adapting this method to the high precipitous areas of Yellowstone and Rocky. In dry areas spray solution was relayed uphill by pumping from station to station to spray R. montigenum concentrations that would otherwise require the more costly Hi-Fog and hand-grubbing methods. Power equipment and chemical were transported by mules as far into the remote areas as a packer could take them. From there moves were made by man packs.

National Park	Acres	Man Days	Ribes	Gallons
Yellowstone	600	840	291,140	21,430
Rocky Mountain	90	260	16,890	4,910
Totals	690	1,100	308,030	26,340

III. Control Status

1. Checking and Surveys

Checking on current year's work was closely coordinated with ribes eradication. All checkers cooperated with camp superintendents to increase eradication efficiency and thereby reduce the amount of mopup necessary. In many cases, checkers trained crewmen in the techniques of searching and the elimination of search in the known ribes-free portions of the mopup lots. Checkers were integrated as working supervisors for ribes eradication whenever checking duties allowed. Most checkers are now qualified for camp superintendent positions in 1957. Regular checking was performed on 3,640 acres of current year work, 5,340 acres were post checked to determine ribes status, and 4,050 acres were surveyed in the proposed Hidden Valley-Windy Gulch area, Rocky Mountain National Park. Areas treated by chemical methods will not be checked until 1957.

2. Summary of Control Status

Current year accomplishments brought 1,820 acres in portions of the control units to maintenance standards. New ribes seed germination continues to be the chief cause for several areas at Glacier and Yellowstone not being classified in the maintenance category. The percentage of initially worked acres now in the maintenance control classification are as follows: Glacier, 68.4 percent; Yellowstone, 67 percent; and Rocky Mountain, 86 percent.

National Park	Total Acres	Unworked Acres	Needing Rework Acres	Needing Post Check Acres	On Maintenance Acres
Glacier	6,010	760	900	760	3,590
Yellowstone	33,290	20,200	3,290	1,030	8,770
Grand Teton	1,010	1,010	-	-	-
Rocky Mountain	8,600	940	280	790	6,590
Totals	48,910	22,910	4,470	2,580	18,950

IV. Recommendations

The following recommended field programs include expanded projects approved by the National Park Service Director in 1956. Personnel requirements coincide with tentative working schedules prepared in agreement with National Park Service Region II officials. Adjustments will be necessary in working schedules and priorities if sufficient funds are not available or because of recent rust invasion. Recommendations are based on a six-day work week for a complete three-month working season. Each park should hire several additional men at the start of the season to compensate for man-day losses caused by late arrivals, quits, fire suppression activities and employees leaving early for school. A strong effort should be made to maintain the average total seasonal employee level as designated.

Recommended Field Programs, 1957

Area	GS-6 Camp Superintendent	GS-5 Checker	Working Leadmen	Laborers	Total
<u>Glacier</u>					
Park Headquarters					
*or Two Medicine	1**	1**	2	6	10
Oldman Lake	-	-	<u>1</u>	<u>5</u>	<u>6</u>
Totals	1	1	3	11	16
<u>Yellowstone</u>					
*Antelope Creek	1	-	3	11	15
*Canyon	1	1	9	36	47
Mt. Washburn Ext.	<u>1</u>	<u>1</u>	<u>3</u>	<u>15</u>	<u>20</u>
Totals	3	2	15	62	82
<u>Rocky Mountain</u>					
Boulder Brook and maintenance control	1	1	3	11	16
Total All Parks	5	4	21	84	114

*Extended or new unit
 **Serve both camps

(J. C. Gynn and C. M. Chapman)



Grand Teton: Snake River Control Area; vista point at Deadman's Bar. Limber pine.



Yellowstone: Canyon Control Area. North portion adjacent to Mt. Washburn unit. Whitebark pine.



Yellowstone: Fishing Bridge Control Area, Yellowstone Lake shore, whitebark pine intermingled with lodgepole.



Rocky Mountain: Packing portable power spraying unit to timber line, 11,500 ft. elevation.



Rocky Mountain: Spraying ribes with 2,4,5-T, using portable power unit.



Yellowstone: Closeup of power unit station. Lightweight G. I. cans serve as chemical mixing tanks.

V. Scouting for White Pine Blister Rust

Extensive scouting for white pine blister rust (Cronartium ribicola) was performed in Montana, Wyoming, northern Colorado, northeastern Utah and southeastern Idaho. Inspections were made in 80 drainages on 14 national forests, three national parks, and two national monuments. Examinations were made on 5,660 white pine trees (Pinus albicaulis and P. flexilis) and on 9,380 ribes bushes of various species.

The rust was found for the first time in Grand Teton National Park, Teton County, Wyoming. A limber pine (P. flexilis) was infected with a fruiting canker in 1947 wood. This indicates the rust on white pine is well established in the park. The disease on ribes (Ribes setosum) was found in a new location in Albany County, Wyoming, near the Medicine Bow National Forest boundary. This is evidence the rust has been spreading into southeastern Wyoming since it was first found on the Pole Mountain District, Medicine Bow National Forest, in 1952.

White Pine Infection Locations

Teton County, Wyoming, Grand Teton National Park, near Deadman's Bar vista point on the Snake River, T. 44 N., R. 155 W., sec. 27. P. flexilis.

Ribes Infection Locations

1. Albany County, Wyoming, outside Medicine Bow National Forest, Rock Creek, 34 miles northwest of Laramie, Wyoming, T. 20 N., R. 77 W., sec. 1. R. setosum.
2. Teton County, Wyoming, Grand Teton National Park, near Deadman's Bar vista point, T. 44 N., R. 115 W., sec. 27. R. viscosissimum.

Pinon Rust Infection

Pinon rust (C. occidentale) was found on ribes in several national forests and monuments in Colorado, Utah, and Idaho. This indicates conditions are also favorable for white pine blister rust as shown by the recently discovered infection centers where pinon rust had previously been found.

Scouting Summary, 1956

Location	Drainages Scouted	Ribes Examined	Pine Examined	New Infection Centers	
				Pine	Ribes
<u>Montana</u>					
Gallatin N. F.	1	100	50		
<u>Wyoming</u>					
Yellowstone N. P.	8	810	2,080		
Teton N. F.	1	190	170		
Shoshone N. F.	9	260	640		
Grand Teton N. P.	3	710	650	1	1
Medicine Bow N. F.	3	610	600		1
<u>Colorado</u>					
*Roosevelt N. F.	9	1,000	460		
Rocky Mountain N. P.	11	800	410		
*Arapaho N. F.	3	590	-		
*Routt N. F.	2	310	-		
<u>Utah</u>					
*Dinosaur N. M.	1	20	-		
*Ashley N. F.	6	300	-		
*Uinta N. F.	3	740	-		
*Wasatch N. F.	5	1,070	20		
*Cache N. F.	6	820	40		
<u>Idaho</u>					
*Caribou N. F.	3	410	180		
Challis N. F.	1	110	-		
*Craters of the Moon N. M.	1	110	270		
Sawtooth N. F.	4	420	90		
Totals	80	9,380	5,660	1	2

*Pinon rust found.

(J. C. Gynn and C. M. Chapman)

VI. Chemical Methods and Ribes Ecology, 1956

1. Highlights of 1956 Work

New chemicals evaluated for spraying actively growing ribes. 2,4,5-T propionic acid satisfactorily kills ribes but presently is about twice as costly as equally effective 2,4,5-T acetic acid. 2-methyl-4-chlorophenoxy propionic acid and a general-type brushkiller combining equal proportions of 2,4-D propionic acid and 2,4,5-T propionic acid were not effective on ribes.

Chemical methods for spraying ribes in late season. 2,4,5-T propionic acid proved slightly more effective than 2,4,5-T acetic acid on dormant ribes when spray was applied by portable pumper or other low volume capacity sprayer. The two acids proved equally effective on dormant ribes when spray was applied by high volume capacity truck-mounted pumper. The difference in kill between types of sprayers is attributed to the greater volume of spray applied by truck-mounted pumper. In late season when soil moisture is low the generous and uniform application of spray volume is far more important than during the summer months when soil moisture is high and plants are actively growing. Ribes sprayed in late season resprout before the following July but many continue to die throughout the summer and early fall season. Rework should not begin until July or later to allow time for resprouts to become visible or to die.

Chemical methods improved by nozzle prong and wood flour marker. Using the nozzle prong to scarify root crowns and wood flour in spray to mark foliage provides a method to check the completeness of spray coverage. Studies are in progress to learn whether more ribes are killed by using nozzle prongs to visibly mark and scarify root crowns while applying spray as a soil drench.

Spraying ribes in spruce cuttings without killing spruce seedlings. Engelmann spruce seedlings should be 2 years or older before spraying ribes in spruce cuttings. Spray should not be applied until July or later to avoid chemical injury of new growth on spruce seedlings. Certain precautionary measures in spraying are advisable. Insofar as practicable spray should be applied selectively to ribes. Mineral soil surfaces on which spruce seedlings are germinating should not be sprayed promiscuously. Examine such ground and if ribes seedlings are present spray them individually or confine spray to the actual area occupied by ribes.

Treatment of excised trunk canker wounds with chemical. Encouraging results have been attained by applying the antibiotic actidione to kill blister rust mycelia in the perimeter of excised trunk canker wounds. Cankers were prepared for treatment by cutting out dead and dying bark from inside the margin of discoloration. Cut surfaces of the wound were painted with actidione. The antibiotic moved downward and laterally around the trunk from the cut surfaces but did not always move upward sufficient height against the flow of food to kill mycelia above the excised trunk canker wound. To facilitate penetration, the chemical should be introduced into bark above the focal point of mycelia and into or slightly beyond

the lateral and lower margins of discoloration encircling a canker. Tests were made in 1956 to explore more fully the chemotherapeutic activity of actidione and other antibiotics on white pine infected with blister rust.

2. Results of Chemical Tests on Ribes

Tests on actively growing ribes. To evaluate new herbicides, plots 1/10-acre in size were sprayed during July and August 1955 in Stella and Iron Creeks, Coeur d'Alene National Forest. To each plot 25 gallons of a 2,000 ppm a.e. aqueous spray were applied by portable pumper and Spraywell nozzle. Ribes viscosissimum and lacustre over 8 inches tall or 1 FLS were crown drenched. Stems, leaves, and branch tips were wet with spray until dripping.

Conclusions. All ribes were killed by ACP-Weedone butoxyethanol ester 2,4,5-T propionic acid, and ACP-329-T (high emulsifier) butoxyethanol ester 2,4,5-T propionic acid. Formulations killing less than 60 percent of the ribes were ACP-L-702 butoxyethanol ester 2-methyl-4-chlorophenoxy propionic acid and ACP-Industrial Brushkiller combining equal proportions of 2,4-D propionic acid and 2,4,5-T propionic acid as a butoxyethanol ester formulation.

Tests on semidormant and fully dormant ribes. The acetic acid and the propionic acid forms of 2,4,5-T were compared in aqueous suspension and in oil/water emulsion by spraying ribes in September and October 1955. Large-scale tests in applying spray by truck-mounted pumper were performed by the Coeur d'Alene blister rust project crews. Tests in applying spray by portable pumper to 1/10-acre size plots were made by the D&I project. Proprietary materials of 2,4,5-T were mixed at the rate of 56 fluid ounces per 100 gallons of water.

Conclusions. Dormant ribes were satisfactorily killed by acetic acid and propionic acid 2,4,5-T forms in oil/water emulsion containing 10 percent stove oil in applying 350 to 400 gallons of spray per acre by truck-mounted pumper. From 87 to 98 percent of the ribes were killed in applying the equivalent of 250 gallons of spray per acre by low volume capacity portable pumper. The difference in kill between types of sprayers is attributed to the higher volume of spray applied by truck-mounted pumper. Because soil moisture is low in September and October, a much higher volume of spray is required to drench root crowns of ribes than in summer when soil moisture is more abundant and plants are actively growing. Rework the year following spraying should not begin until July or later to allow time for resprouts to become more visible or to die.

Chemical methods for spraying ribes in bug-killed spruce cuttings. Studies were undertaken to develop chemical methods for spraying ribes that would not be injurious to spruce seedlings in bug-killed spruce cuttings. Plots 1/10-acre in size were sprayed July 18, 1956, in Keeler Creek, Kootenai National Forest. The species R. lacustre and coloradense varied in age from current year seedlings to plants 20 years old. Spray was applied selectively to foliage and to root crowns of plants over 8 inches tall or 1 FLS. Foliage of smaller plants was wet by applying spray broadcast over all low-growing vegetation. The acetic acid and the propionic acid forms of 2,4,5-T were tested separately in aqueous spray at 1,500 ppm a.e. and in combination at 750 ppm a.e. each. Spray volume applied to each plot was equivalent to 220 to 250 gallons per acre. Milacre plots were established to record the species, age,

and number of conifer seedlings in each chemical plot. In the table, the denominator shows the average number of seedlings per milacre plot before spraying July 18; the numerator shows the average number of live seedlings per milacre plot on October 8 or 84 days after spraying.

Plot Number	Number Milacres	Engelmann Spruce				Western White Pine				Alpine Fir		
		Age in Years				Age in Years				Age in Years		
		1	2	3	4	1	2	3	4	1	2	3
1	2	$\frac{8}{9}$	$\frac{1}{2}$	$\frac{2}{2}$	$\frac{10}{10}$	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{2}{6}$	$\frac{5}{12}$	$\frac{1}{1}$
2	3	$\frac{33}{37}$	$\frac{16}{17}$	$\frac{6}{6}$	$\frac{5}{5}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{2}{2}$		$\frac{15}{30}$	$\frac{6}{7}$	
3	3	$\frac{53}{58}$	$\frac{7}{7}$	$\frac{6}{6}$	$\frac{4}{4}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$		$\frac{30}{41}$	$\frac{3}{3}$	$\frac{1}{1}$
Check	2	$\frac{25}{27}$	$\frac{15}{15}$	$\frac{14}{14}$	$\frac{10}{10}$	$\frac{1}{1}$	$\frac{1}{1}$		$\frac{3}{3}$	$\frac{10}{11}$	$\frac{21}{22}$	$\frac{1}{1}$

An opportunity was afforded in 1956 to study the effects of present chemical methods on conifer reproduction in bug-killed spruce cuttings with forest blister rust project crews spraying ribes in Fairway Creek, Kootenai National Forest. Logged in 1954, the ground surface was scarified by dozer in 1955 to prepare a favorable seedbed for the germination of spruce and other conifer seeds. The area was sprayed with an aqueous solution of the isooctyl ester 2,4,5-T applied at the rate of 350 to 400 gallons per acre. The mixture consisted of 48 fluid ounces of proprietary material per 100 gallons of water. A single species *R. lacustre* varied in age from current year seedlings to old mature plants. Bushes over 8 inches tall or 1 FLS were crown drenched. Spray was applied selectively to the foliage of large plants. Small ribes were wet by applying spray broadcast over all low-growing vegetation. To record species, age, and number of conifer seedlings growing in full sun and in half shade before and after spraying milacre plots were established throughout the area. Tabular data show the average number of seedlings per milacre plot before the July and August spraying in the denominator and the average number of live seedlings per milacre plot in the numerator approximately 2½ months after spraying.

Species	Spray Area				Nonspray Area			
	Full Sun		Half Shade		Full Sun		Half Shade	
	Year of Origin 1956	Year of Origin 1955	Year of Origin 1956	Year of Origin 1955	Year of Origin 1956	Year of Origin 1955	Year of Origin 1956	Year of Origin 1955
Engelmann Spruce	$\frac{57}{73}$	$\frac{14}{14}$	$\frac{55}{69}$	$\frac{6}{6}$	$\frac{39}{40}$	$\frac{1}{1}$	$\frac{55}{58}$	$\frac{3}{3}$
Western White Pine	$\frac{11}{12}$	$\frac{1}{1}$	$\frac{12}{14}$	$\frac{1}{1}$	$\frac{10}{10}$	$\frac{5}{5}$	$\frac{15}{16}$	$\frac{2}{2}$
Alpine Fir	$\frac{3}{12}$	$\frac{2}{4}$	$\frac{2}{10}$	$\frac{2}{3}$	$\frac{4}{4}$	$\frac{6}{7}$	$\frac{2}{2}$	$\frac{3}{3}$
Western Larch	$\frac{1}{17}$	$\frac{4}{10}$	$\frac{3}{28}$	$\frac{5}{10}$	$\frac{20}{21}$	$\frac{6}{6}$	$\frac{12}{12}$	$\frac{7}{7}$

Conclusions. Engelmann spruce seedlings should be 2 years or older before spraying ribes in bug-killed spruce cuttings. At this age, spruce seedlings are moderately resistant to the growth hormone-type chemical 2,4,5-T if spray is not applied before new growth fully develops in July. Current year seedlings on the other hand are moderately susceptible to hormone-type spray because growth is succulent. In Fairway Creek, 21 percent of the current year spruce seedlings were killed within 2½ months after spraying. Many other first year seedlings that have been severely injured by spray will succumb during the winter months. Besides waiting until spruce seedlings become 2 years or older before spraying, other precautionary measures are advisable. Insofar as practicable spray should be applied selectively to ribes. Mineral soil surfaces on which spruce seedlings are germinating should not be sprayed promiscuously. Examine such ground and if ribes seedlings are present spray them individually or confine spray to the actual area occupied by ribes.

3. Results of Chemical Tests on Infected White Pine

Chemical treatment of excised trunk canker wounds. To develop a chemical method for saving infected white pine, trunk cankers were excised and treated with chemotherapeutic agents in July 1953 in Solitaire Creek, Coeur d'Alene National Forest. Pole-size trees were selected, which had trunk cankers producing pycniospores or aeciospores. Both fruiting and nonfruiting cankers were treated when trees had more than one trunk canker. Lower limbs to one-third the crown height were first removed by a pruning saw. A hatchet and pocket knife were used to remove dead and dying bark from inside the margin of discoloration to leave mycelia in the perimeter of the wound. Nonfruiting cankers were prepared for chemical treatment by removing with a knife a small section of live bark from inside the margin of discoloration. A paint brush was used to apply chemical to the cut surface of wounds.

Conclusions. Blister rust mycelia in the perimeter of excised trunk canker wounds were killed by the antibiotic actidione. The chemical moved downward and laterally around the trunk from cut surfaces but did not always move upward a sufficient height against the flow of food to kill mycelia above the excised trunk canker wound. In one case actidione did not move laterally across a neighboring limb on the whorl in which infection entered the trunk. To facilitate penetration, actidione should be introduced into bark above the focal point of mycelia and into or slightly beyond the lateral and lower margins of discoloration encircling a canker. Endomycin and calcium sulfamate were not effective chemicals for this type of treatment.

Growth State of Excised Trunk Canker; Incipient, Pycniospore, or Aeciospore										
Chemical	ppm	10-trees Average		Numerator - Number Killed; Denominator - Number Treated			Percent Killed			
		Ht.	DBH	I	P	A	I	P	A	Total
Actidione	150	20.7	4.77	$\frac{6}{6}$	$\frac{2}{3}$	$\frac{7}{9}$	100.0	66.7	77.8	83.3
	300	21.8	4.73	$\frac{6}{7}$	$\frac{4}{5}$	$\frac{7}{10}$	85.7	80.0	70.0	77.3
	600	21.3	4.67	$\frac{8}{8}$	$\frac{1}{3}$	$\frac{7}{9}$	100.0	33.3	77.8	80.0
Endomycin	150	15.5	3.62	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{0}{5}$	25.0	20.0	0	14.3
	300	19.2	4.34	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{0}{6}$	62.5	75.0	0	44.4
	600	19.4	4.55	$\frac{5}{10}$	$\frac{2}{5}$	$\frac{1}{7}$	50.0	40.0	0	36.4
Calcium sulfamate (%)	1.6	17.7	3.69	$\frac{2}{4}$	$\frac{0}{3}$	$\frac{0}{9}$	50.0	0	0	12.5
	2.0	19.2	4.05	$\frac{2}{6}$	$\frac{1}{5}$	$\frac{0}{8}$	33.3	20.0	0	15.8
	5.0	20.9	4.89	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{1}{10}$	40.0	50.0	10.0	23.5
Check	0	17.2	3.64	$\frac{3}{5}$	$\frac{1}{5}$	$\frac{0}{7}$	60.0	20.0	0	23.5

4. Studies in Progress

To compare the effectiveness of chemical and hand pulling ribes eradication methods by timing control measures to destroy ribes 2, 3, and 4 years after logging slash has been dozer piled and burned in heavy partial cuttings of western white pine stands.

To compare separately and in combination the acetic acid and the propionic acid forms of 2,4,5-T in aqueous suspension and in oil/water emulsion applied in late season to dormant ribes.

To determine the practicability of using the Hi-Fog gun mist sprayer in the basal stem treatment of ribes resprouts with the acetic acid and the propionic acid forms of 2,4,5-T in stove oil carrier.

To evaluate new herbicides for killing actively growing ribes and dormant ribes.

To determine whether nozzle prongs used as a marker to scarify basal stems and root crowns while spray drenching soil around ribes increases the effectiveness of chemical treatment.

To test antifungal antibiotics and improve methods in applying chemotherapeutic agents to save white pine infected with blister rust.

To study ribes ecology as an aid to improving timber cutting practices and slash disposal measures for the establishment of blister rust control.

(V. D. Moss)

VII. Development of Rust Resistant White Pine, 1956

Work aimed at exposing the genetic nature of selected rust resistant trees was continued. This included vegetative propagation, controlled pollination, and producing, inoculating, and appraising the F_1 progenies of rust resistant parent trees. Promising preliminary results as presented in the 1955 report are holding up. In addition, a major part of the 1956 field season was given over to two new projects: (1) locating additional selected rust resistant parents, and (2) searching for suitable areas on which to expand experimental work or on which to establish rust resistant seed orchards.

Genetics of Rust Resistance

At present 45 of the selected rust resistant parent trees are included in the controlled pollination program. We are beginning to have some understanding of the genetic nature of resistance in about 30 of these trees through appraisal of performance of their F_1 progenies. The most important finding to date is that three or more of the 30 trees (10 percent) contain at least partially dominant genes somehow causing resistance either to establishment or later development of the rust fungus in the needles. Since the genes are dominant they are transmitted in some degree to all the offspring of the three parent trees concerned. Others of the 30 parent trees are beginning to be recognized as containing genes for bark resistance, but it is still too early to appraise the character or level of resistance involved.

In the case of foliar resistance, when two parents, both containing dominant genes for resistance, are crossed the resulting progeny is usually more highly resistant than when only one such parent is involved. This additive effect indicates that different parents contain at least some different genes for foliage resistance. Genetically, resistance seems to be quite complicated and probably involves different genes for foliage resistance in different parents as well as other genes for bark resistance.

Practical Implications of Heritability of Rust Resistance

The important fact, however, is that in the best F_1 progenies the cumulative effect of the various forms of resistance is considerable. These progenies have two to three times the level of resistance to needle spotting as found in non-resistant controls. Ultimately, 20 to 30 percent of the individual seedlings of the best F_1 's may survive intense artificial inoculation. Just what this level of juvenile plant resistance means in terms of mature tree resistance under conditions of far less intense but longer lasting natural rust exposure remains to be seen. We know that the intensity of artificial infection exceeds many times that of any natural infection ever observed in the field. Also, that two to five years' exposure of F_1 progeny seedlings and parent tree grafts to rust from fairly heavy concentrations of ribes planted on the field plots has resulted in practically no infection of the resistant seedlings or grafts. Thus, chances are good that the best F_1 progenies will contain a level of resistance useful in field planting until more highly resistant materials can be bred.

The solution of the artificial vs. natural exposure problem lies in work now underway. For the last 2 years a few of the controlled crosses which yielded the most highly resistant F₁ progenies have been remade to the limit of flowering in the trees concerned. In 1956 we harvested from 1,350 to 1,725 control pollinated seed of three such progenies and in 1957 similar seed yields are expected from the same and other mass-production crossings. These seed will be sown beginning in 1957 and the seedlings grown to outplanting size without being subjected to artificial inoculation. Seedlings will then be outplanted, with nonresistant controls, in several small acreages in areas of varying blister rust infection severity. Within 10 years or less we should begin to detect differences in resistance accruing to the resistant stock and to solve the questions of the difference between juvenile resistance under conditions of artificial inoculation vs. more mature resistance under conditions of field exposure.

Selection Work Receives Major Emphasis in 1956

Four man months of professional and subprofessional time were given to an intensive search for new resistant trees. Work was concentrated on the Clearwater, Coeur d'Alene, and Kaniksu National Forests since the majority of selections currently being bred are on the St. Joe National Forest. The work was very productive, largely because BRC staffmen of the forests concerned helped to channel the search onto several large, very heavily infected areas. The number of new selections found is shown below.

<u>Clearwater National Forest</u>		<u>Number</u>
North Fork Clearwater River (Kelly Forks to Weitas Creek)		18
Long Creek - Cedars Ranger Station		41
<u>Coeur d'Alene National Forest</u>		
Randolph Creek, St. Regis District		7
Rainy Creek, St. Regis District		35
Placer Creek, Wallace District		13
Scott Creek, Kingston District		5
<u>Kaniksu National Forest</u>		
Ole Creek, Falls District		2
South Fork Granite Creek, Priest Lake District		2
Total		123

Appraisal of these new selections can be greatly simplified. Knowledge that resistance factors are dominant and are thus transmitted in some degree to all F₁ (including wind-pollinated progenies) progenies will be of assistance. About 70 of the 123 new selections bore 1956 cones and we secured sound seed from 66 of these cone bearers. Since it appears that wind-pollinated seedling progenies will suffice to determine transmission of dominant resistance factors only the wind-pollinated progenies are now slated for the complicated and drawnout testing procedure. Only those trees eventually found to have some degree of heritable resistance will be included in future controlled pollination work.

The Outlook for Securing Practical Benefits

Present results warrant immediate expansion of the rust resistance work. With the good possibility that certain F_1 progenies will prove to have a high level of resistance we may wish to launch an F_1 seed orchard program within 10 years. In this first 10-year period, given adequate facilities and lands, we can be halfway through the work and time (about 20 years) required for production and testing of the F_2 and backcross generations with promise of securing an even higher level of field resistance. Thus, we believe that there is a better than average chance that we will want to establish either F_1 orchards about 10 years hence or F_2 orchards 20 years hence.

Permanent Facilities And Land Required for Future Expansion

Before proceeding with either type of orchard, much experimental work must be undertaken. Knowledge concerning pollen dispersion, flower induction, and optimal cultural practices in white pine seed orchards is prerequisite to either F_1 or F_2 orchard establishment. Plans are now underway for securing suitable facilities and lands on which to conduct this work. (R. T. Bingham)

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Region 5

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Annual

A N N U A L R E P O R T

ON

THE CONTROL OF WHITE PINE BLISTER RUST

IN CALIFORNIA

FOR THE CALENDAR YEAR 1956

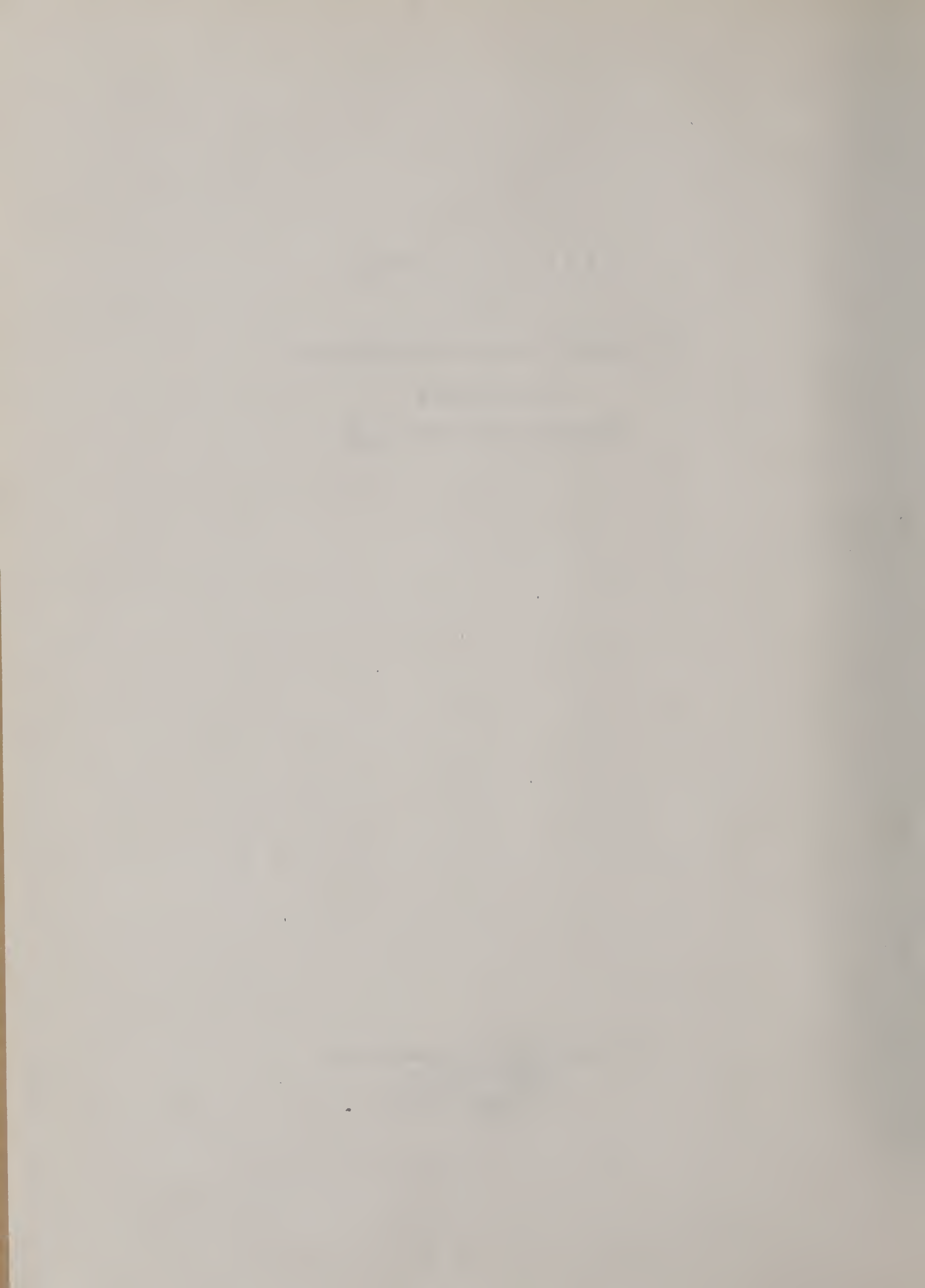


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THE BLISTER RUST CONTROL PROGRAM - 1956

By

Neil J. MacGregor, BRC Officer

White pine blister rust, a fungus-caused disease which was introduced into North America from Europe about 1900, is now widespread throughout Northern California and is epidemic on thousands of acres in the northwest portion of the State. The disease fatally attacks all of California's white pines and seriously threatens the continued production of sugar pine, one of the State's most valuable timber species. Endangered white pines other than sugar pine are western white pine, whitebark pine, limber pine, foxtail pine, and bristlecone pine. These species are of value principally for recreational, aesthetic, and scientific purposes. Control of blister rust is accomplished through the eradication of wild gooseberry and currant bushes (ribes) which act as alternate hosts for the parasitic disease.

A COOPERATIVE PROJECT

Cooperation between Federal and State agencies and private industry is the keynote of the blister rust control program in California. The U. S. Forest Service furnishes over-all leadership, technical direction, and coordination to the entire program and conducts control projects on land under its jurisdiction. The Forest Service in cooperation with the State conducts control programs on lands of private owners engaged in sugar pine management. Control programs are in progress on national and State parks and on commercial forests administered by the California Division of Forestry.

The financing available for control work in fiscal year 1957 is given in the following table:

BLISTER RUST CONTROL FINANCING
FISCAL YEAR 1957

State of California	Private Owners	Federal Allotments				Total
		State & Private Lands	National Forest Lands	National Park Lands	Technical Direction & Methods Development	
\$125,000	\$6,050	\$52,000	\$263,000	\$178,340	\$129,000	\$753,390

WORK ON PRIVATE LANDS FINANCED JOINTLY

The encouragement and strong financial support of the State of California makes possible the protection of many of the best privately owned sugar pine stands in the State. The State appropriation is matched by the Federal Government, and private operators are encouraged to participate financially through voluntary contributions. To date 8 owners have made such contributions while 53 others have signed statements of understanding in which the intent to manage for sugar pine is expressed.

SELECTION OF BLISTER RUST CONTROL UNITS

Blister rust control units in California include areas managed largely for timber production as well as those set aside for recreation, aesthetic, and scientific purposes. In the case of commercial forests, control units are selected on a strictly economic basis. That is, the increased value expected from intensive management, of which blister rust control is a vital part, is compared with the cost of securing such additional return. Control measures are undertaken only where a net gain is indicated.

The location and extent of control units in noncommercial forests is determined by State and national park officials assisted by blister rust specialists of the Forest Service. The objectives in establishing such units are the preservation of outstanding stands of white pine and the perpetuation of white pine in stands of mixed composition where its loss would seriously reduce the aesthetic value of the area.

OWNERSHIP OF BLISTER RUST CONTROL UNITS IN CALIFORNIA

Ownership	Commercial Forest	Recreational or Aesthetic Forest	Total	Per Cent Initially Worked
Private	237,162	-	237,162	79
State of California	3,726	6,715	10,441	75
National Forest	245,162	-	245,162	74
National Park	-	162,955	162,955	92
Totals	486,050	169,670	655,720	80

CURRENT STATUS OF CONTROL PROGRAM

Control unit acreage was increased by almost 28,000 acres in 1956. Major additions this year include 6,500 acres of privately owned land in Modoc County, the D. L. Bliss and Emerald Bay State Parks (2,500 acres), and a new high-elevation unit in the Kings Canyon National Park.

Other net additions, most of which resulted from revision and more exact delineation of existing units, occurred on the following operations: Shasta-Trinity (6,000 acres), Lassen (3,500 acres), Plumas (2,000 acres), and Tahoe (1,000 acres).

EIGHTY PER CENT OF INITIAL WORK DONE

As a result of these changes the percentage of area having received initial treatment was reduced slightly and is now 80 per cent of the total control area in the State. Area on maintenance was increased by almost 40,000 acres, but again because of control unit acreage revision, the percentage of maintenance area does not increase proportionately. At present 29 per cent of the control area within the State is on maintenance. (The maintenance figure is influenced to a considerable extent by the national park operations where 67 per cent of the control area is on maintenance.)

RUST SPREAD IN CALIFORNIA

The spread of blister rust in California remained relatively static during 1956 with the southernmost known infection on pine still located at Dodge Ridge on the north-central portion of the Stanislaus Forest. Intensive scouting on the Sierra Forest failed to uncover any infection.

EPIDEMIC CONDITIONS IN NORTHWESTERN CALIFORNIA

The rust continued to spread locally and to intensify on pine in Trinity, Shasta, and Siskiyou Counties where, in many areas, the disease is epidemic, damage is extensive, and small sugar pine trees are beginning to disappear from the stand. In the lower Klamath River drainage areas of up to 300 acres occur in which as much as 90 per cent of the sugar pines 12 inches and under are infected. In smaller areas where intensification conditions are optimum 100 per cent of the small pines are infected.

RUST WIDESPREAD IN NORTHERN COUNTIES

Further evidence of widespread rust incidence on white pine was noted in Tehama, Butte, Yuba, and Plumas Counties where sub-epidemic conditions occur in many locations throughout the sugar pine type. Numerous infection centers ranging in size from isolated trees to 100 acres have been located to date. Within control units, however, where at least one ribes eradication has been performed, no significant amount of post-eradication infection has been found as yet.

ALTITUDINAL RANGE OF RUST EXTENDED

The known altitudinal range of the rust was extended in the Trinity Alps where the disease has continued to creep upward wherever ribes species of medium to high susceptibility occur in association with western white and whitebark pine. Serious damage and mortality is being sustained by high-elevation stands of these species in the Marble Mountains of western Siskiyou County.

1956 A POOR YEAR FOR INTENSIFICATION AND SPREAD

Although spring and early summer climatic conditions in Northern California and Southern Oregon appeared highly favorable for local pine-to-ribes spread, and, in fact, record infection on ribes was noted, little if any intensification on ribes occurred during the summer in most infection centers. Since summer intensification on ribes is generally necessary for appreciable subsequent reinfection on pine, rust build up on pine was probably not great in 1956. Rust occurrence on ribes proved to be light during August and September with telia production light to completely lacking. Extensive scouting also failed to reveal appreciable long-range spread from pine to ribes.

RIBES ERADICATION - 1956

Ribes eradication, the major blister rust control job in California, was performed on almost 37,000 acres in 1956. An additional 27,000 acres which had been worked previously were examined and found to require no work at this time. This resulted in the completion of 90 per cent of all eradication work previously scheduled for the 1956 season and coverage of all areas currently requiring reeradication treatment. About 20 per cent of the area covered this year received a maintenance treatment, the remainder being divided more or less equally between initial and reeradication. Nearly all of the maintenance work occurred on national park units.

SUMMARY OF RIBES ERADICATION - 1956

Project	Acres			Total Man Days	Thou- sands of Ribes De- stroyed	Total Acres Checked	Contract Eradication	
	Worked	Checked and Meeting Standards	Total				Acres Worked	Av. Price Paid Per Acre
State & Private	11,779	11,957	23,736	7,275	1,981	54,347	10,126	11.56
National Forest	12,363	11,040	23,403	6,876	1,935	55,796	11,486	9.56
National Park	12,474	4,120	16,594	5,830	422	44,102	3,418	8.67
Totals	36,616*	27,117	63,733	19,981	4,338	154,245	25,030	10.24

* Includes 318 acres treated by herbicidal chemicals 2,4-D and 2,4,5-T.

CONTRACTING

Contracting continued to occupy a major role in the ribes eradication picture with about 90 per cent of all work on national forest, State and private units employing this method. The bulk of the national park work was performed by hired crews.

CONTRACT PRICES HIGHER

Bid prices on contracts tended to be higher throughout the Region this season. The marked increase Region-wide in bid prices (up about 50 per cent from 1955) resulted mainly from the large amount of difficult and expensive work scheduled for this season in Fresno County and on the D. L. Bliss State Park. Exclusive of these operations, which accounted for about 25 per cent of the acreage worked under contract, the average price paid to contractors was about \$8 per acre. The bulk of the difficult initial eradication is now finished on these operations and future contract prices are expected to be more in line with previous costs.

Contractors were in sufficient abundance on nearly all operations, and competition was generally satisfactory throughout the season.

STATE AND PRIVATE PROJECT

The State Board of Forestry at its June, 1956 meeting re-examined the State's blister rust control policy for work on State and private land, expressed satisfaction with the existing policy, and extended its period of applicability through June 30, 1961. In brief the financial aspects of the policy call for State assumption of full cost of control on State land, the State's matching up to 50 per cent of the cost of control on privately owned lands, and the encouragement of contributions from private landowners of not less than 25 per cent of the cost of control on their lands. During fiscal year 1957 the State appropriated \$125,000.

WORK STARTED ON NEW UNITS

Control units totalling about 2,500 acres were selected in the D. L. Bliss and Emerald Bay State Parks by officials of the State Division of Beaches and Parks and the California Division of Forestry in cooperation with Forest Service blister rust control specialists. The initial eradication of ribes from these units was begun in 1956.

Preliminary survey work (advance ribes checking) was begun on newly established control areas in Modoc County. The units, about 6,500 acres, are managed by the Shasta Forests Company and are composed principally of privately owned land. Initial ribes eradication is scheduled for 1957. The work will be done under contract.

INTENSIVE SUGAR PINE MANAGEMENT ON PRIVATE LAND

A well-integrated program of management practices aimed at continued production of high quality sugar pine got under way this year on lands of a progressive private owner in Fresno County. Seed spotting of sugar pine in conjunction with brush removal and rodent control has been undertaken, sugar pine seedlings have been set out, and stand improvement measures, pruning and release cutting have been applied extensively within sugar pine management units near Shaver Lake. The initial removal of ribes from within the units is almost finished.

RIBES CONCENTRATIONS TREATED WITH CHEMICALS

Dense concentrations of ribes on private land in the Ely Meadow area of Fresno County and the Mountain Home State Forest were treated with the herbicidal chemical 2,4-D. The Ely Meadow job was accomplished with a hired crew, while at Mountain Home labor from the Bear Creek Honor Camp was used. This crew was also engaged in the hand eradication of ribes. The initial coverage of the Mountain Home control area is now about 80 per cent complete and will be finished in 1957.

PREMAINTENANCE WORK NEARLY FINISHED IN CALAVERAS PARK

All scheduled reeradication in the North Grove portion of Calaveras Big Trees State Park was completed this season. Nearly all the North Grove is now on maintenance, and little future work will be required. Active regeneration of ribes in cut-over portions of the South Grove will necessitate work in this section of the Park next year, however. With the exception of these cut-over areas the South Grove is also largely on maintenance.

LITTLE WORK NEEDED AT LATOUR

As a result of a slow post-eradication ribes build-up in cut-over portions of Latour State Forest control areas, little work was required this season. Pine infection continues to build up just outside of the units, however, and a careful examination of all control units coupled with some close-standard ribes eradication is scheduled for 1957.

FIELD TRIP FOR CALIFORNIA DIVISION OF FORESTRY OFFICIALS

A two-day blister rust control field trip for California Division of Forestry foresters was conducted in early June this year by Forest Service Regional Office personnel. A basic understanding of control problems and methods was the objective of the trip which included on-the-ground inspection of control units and infection centers in Northern California. The trip included demonstrations of field techniques and discussions of over-all objectives, policies, and procedures. Six members of the California Division of Forestry staff participated.

NATIONAL PARK PROJECT

Nearly 6,500 acres were added to maintenance status on National Park Service operations this year bringing the total maintenance acreage to 110,000 acres. Also, in spite of new units being added this year, initial coverage of national park units is 92 per cent complete.

The acreage by principal white pine species is given below for all National Park Service control units.

ACREAGE BY SPECIES

National Park	Acres				
	Sugar Pine	Western White Pine	Foxtail Pine	Whitebark Pine	Total Acres
Lassen Volcanic	2,145	20,581	-	3,121	25,847
Yosemite	85,667	-	-	-	85,667
Sequoia-Kings Canyon	30,926	1,600	13,915	5,000	51,441
All	118,738	22,181	13,915	8,121	162,955

LASSEN VOLCANIC NATIONAL PARK

The whole of the originally established control units in the Park, 17,779 acres, is now on maintenance. The entire area was covered in 1956 to verify its maintenance status and to perform the small amount of maintenance work required at present. Future plans for these units call for infrequent periodic inspection and a small amount of maintenance work.

Within the remaining units, all of which are recent additions, initial coverage is about 60 per cent complete and is expected to be substantially finished next year. Of the Juniper Lake unit, largest of these and the area in which initial eradication has been concentrated during the past two seasons, only about 20 per cent remains unworked, and the bulk of this is already under contract for 1957 completion. Initial work next year is also scheduled for the Sulphur Works-Mineral Entrance area.

YOSEMITE NATIONAL PARK

Four camps, Crane Flat, Chinquapin, Base Line, and Little Yosemite Valley were active this year employing 85 eradicators and checkers. About 1,200 acres were also worked by three sets of contractors. All current-season contracts were completed. All ribes eradication with the exception of 300 acres in Little Yosemite Valley and 686 acres worked under contract was reeradication or maintenance work. The initial treatment of all pack-camp units was completed this year, and no pack camps are scheduled for 1957. One checker foreman and 7 checkers were required for post checking in the Smith Meadows and Base Line areas and for regular checking as required.

SEQUOIA AND KINGS CANYON NATIONAL PARKS

Maintenance checking and eradication occupied a 30-man crew quartered at Red Fir this summer. Although fire and rescue work cut heavily into available man days, about two thirds of the Giant Forest unit was covered. Most of

the remaining acreage of the unit received similar treatment last year. This unit is now almost entirely on maintenance, and little eradication work was needed. The development of inspection and eradication methods best suited to the special problems presented by a large-scale maintenance program continued to be stressed. A new high country unit of 5,000 acres was established in the Rae Lakes-Charlotte Lake area. This unit lies at the center of one of the Park's most heavily used wilderness areas, and includes outstanding stands of whitebark pine. Ribes eradication in this unit is scheduled to begin in 1957.

NATIONAL FOREST PROJECT

During the 1956 field season 23,000 acres of national forest land on 10 forests received blister rust control coverage. Slightly less than half of this acreage was examined and found to require no ribes eradication work at this time. The area on which eradication treatment was necessary, about 12,000 acres, was divided about equally between initial and reeradication. The bulk of the work was handled under contract.

CONTRACT COMPETITION ADEQUATE

With few exceptions contractors were in good supply throughout the Region this year and competition was generally adequate. On the whole contractors performed well and relatively few penalty checks or cancellations were necessary. The Lassen experienced the first instance of an open market purchase being cancelled when the contractor, after five inspections, failed to complete the job within the required time. No administrative difficulties were experienced in making the cancellation. Extension of completion dates was required on few contracts, and most forests had little or no contract carryover.

PERMANENT PERSONNEL GIVEN BRC TRAINING

Blister rust control was used to a greater extent this year than previously as a training assignment for junior foresters and other permanent employees. This was particularly true on the Stanislaus where two junior foresters supplemented the 1956 checking force of four seasonal employees, and two other members of the permanent staff were given late-season training preparatory to the assignment of checking duties next year. Such assignments are of value not only from a training standpoint but also serve to fill the early and late-season gaps when seasonal checkers are not available.

CENTRALIZED SUPERVISION FOR NORTHERN FORESTS

Responsibility for over-all supervision and coordination of blister rust control work on the Shasta-Trinity, Klamath, Mendocino, and Modoc was assigned to the Shasta-Trinity. Work on these forests was handled at the district level with the general assistance of a timber management staff officer of the Shasta-Trinity. Checkers from the Shasta-Trinity were detailed to other forests as needed.

FORCE-ACCOUNT CREWS USED TO ADVANTAGE

Small force-account crews proved advantageous on the Lassen and Plumas in coping with the problem of small, lightly populated areas where a rapid coverage to keep regeneration in check is all that is required. Such areas are generally unsuitable for contracting because of the excessive administrative costs involved. On the Plumas the two-man crew was engaged in spray work until early July and finished the season doing roadside clean up and spot work.

In order to compare contract and force-account costs the Lassen crew was assigned a small block which normally would have been worked under contract. Although the crew was rated as excellent and had performed well all summer, their work on the "contract" block appeared to be of lower quality and more costly than would have been expected from contractors.

PRUNING CONTINUED AT LOOKOUT POINT

The sanitation pruning job which has been under way for the past two years in the Lookout Point area of the Shasta-Trinity was continued on a small scale this summer and is now nearing completion. Another small area in the same general locality was marked for similar treatment next year. Contracting is being considered as a means of handling the 1957 work.

SUGAR PINE MANAGEMENT CONSIDERED IN TIMBER SALES

Timber sales directed toward the improvement of thrifty pole stands of sugar pine were made this year on the Stanislaus and Shasta-Trinity. In both cases marking practice was aimed at the removal of old residual stands of fir and the release of the sugar pine understory. Stand improvement collections will be used to seed spot and interplant sugar pine, to release sugar pine crop trees from competing understory fir, and to prune all sugar pine crop trees. Christmas tree sales are planned on the Stanislaus as a means of further releasing sugar pine crop trees. Both forests plan to continue the operations for several years.

SUGAR PINE MANAGEMENT MEASURES WIDELY EMPLOYED

Considerable progress in the field of sugar pine management was made during the year throughout the Region. Major projects are described briefly below:

Mendocino: Stand improvement work aimed at increasing sugar pine stocking was undertaken in the Spanish Creek area. Specific sugar pine management plans have been formulated for portions of the Eel River working circle.

Tahoe: Brush was removed and sugar pine seedlings were planted in two areas this spring. Fall inspection of the plantations showed good survival.

Sierra: Brush removal and seed spotting with endrin-treated sugar pine seed was applied to several small areas on the Pineridge District while both inter-planting and pruning projects were carried out within sugar pine management areas of the Minarets District.

Sequoia: Sugar pine planting was begun within the control areas burned in the McGee fire of 1955.

Plumas: Seed spotting of sugar pine in conjunction with a rodent control program was employed in cut-over areas where insect damage to sugar pine cones reduced the likelihood of satisfactory natural regeneration.

BRC HANDBOOKS REVISED

Completely revised BRC handbooks were issued to the field this fall. The handbooks which are composed of independent sections for the use of BRC officers and seasonal employees combine in one volume all the technical material needed in the administration of control operations. A section dealing with disease surveys will be prepared this winter. Five fact sheets covering the major phases of the blister rust control program in California and intended for general distribution were prepared. Regional Office personnel also participated in high country reconnaissance trips on the Sierra, Stanislaus, and Shasta-Trinity National Forests and Kings Canyon National Park.

STATUS OF RIBES ERADICATION IN CALIFORNIA AS OF DECEMBER 31, 1956

Ownership	Control Operation	Control Units		Status of Ribes Eradication			
		Total Acres	Acres Unworked	Net Acres by Workings			Acres on Maint.
				Initial	Reerad.	Maint. Work	
WORK DONE BY THE STATE COOPERATIVE PROJECT							
PRIVATE LAND	Mendocino (Glenn County)	600	600				
	Klamath (Siskiyou County)	2,300		2,300	3,974	1,735	2,300
	Shasta-Trinity (Siskiyou and Shasta Counties)	9,887	6,032	3,855	205		
	Modoc (Siskiyou and Modoc Counties)	6,546	6,546				
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)	94,008	20,510	73,498	75,957	267	39,397
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)	22,839	5,340	17,499	35,151		
	Tahoe (Sierra, Nevada, and Placer Counties)	1,908	57	1,851	241		
	Eldorado (Eldorado, Placer, and Amador Counties)	42,120	7,164	34,956	60,461		5,430
	Stanislaus (Calaveras and Tuolumne Counties)	43,023	3,030	39,993	51,651		5,644
	Sierra (Mariposa, Madera, and Fresno Counties)	13,931	1,710	12,221	8,163		620
	TOTAL	237,162	50,989	186,173	235,803	2,002	53,391
STATE LAND	Latour State Forest	1,878	323	1,555	320		583
	Blodgett Forest-Univ. of Calif.	1,160		1,160	2,932		
	D. L. Bliss-Emerald Bay State Parks	2,456	2,155	301			
	Calaveras Big Trees State Park	4,259		4,259	8,418		2,707
	Mountain Home State Forest	688	155	533			
	TOTAL	10,441	2,633	7,808	11,670		3,290
TOTAL STATE AND PRIVATE		247,603	53,622	193,981	247,473	2,002	56,681
WORK DONE BY THE FOREST SERVICE							
NATIONAL FOREST LAND	Mendocino	4,200	3,233	967			
	Klamath	2,238		2,238	2,326	667	2,238
	Shasta-Trinity	6,387	1,466	4,921	3,264		
	Modoc	80	80				
	Lassen	17,928	5,011	12,917	9,025	66	4,063
	Plumas	60,574	22,766	37,808	62,799	395	2,026
	Tahoe	18,648	1,508	17,140	5,335		
	Eldorado	35,655	7,730	27,925	31,721		1,984
	Stanislaus	43,375	948	42,427	83,884		13,916
	Sierra	49,684	20,579	29,105	34,157		500
	Sequoia	6,393	391	6,002			
	TOTAL	245,162	63,712	181,450	232,511	1,128	24,727
WORK DONE BY THE NATIONAL PARK SERVICE							
NATIONAL PARK LAND	Lassen Volcanic	25,847	3,355	22,492	25,700	1,064	17,779
	Yosemite	85,667	4,109	81,558	100,007	6,333	54,847
	Sequoia-Kings Canyon	51,441	5,000	46,441	54,669	5,096	37,303
	TOTAL	162,955	12,464	150,491	180,376	12,493	109,929
ALL WORK DONE IN CALIFORNIA							
ALL CONTROL OPERATIONS		655,720	129,798	525,922	660,360	15,623	191,337

TABLE 2

SUMMARY OF RIBES ERADICATION IN CALIFORNIA - 1956

Ownership	Control Operation	Acres			Total Man Days	Thousands of Ribes Destroyed	Total Acres Checked (All Classes)	Contract Eradication	
		Worked (Contract And Camp Crews)	Checked And Meeting Standards Without Work	Total				Acres Worked	Average Price Per Acre Paid to Contractor
WORK DONE BY STATE COOPERATIVE PROJECT									
PRIVATE LAND	Mendocino (Glenn County)								
	Klamath (Siskiyou County)								
	Shasta-Trinity (Siskiyou and Shasta Counties)	972	35	1,007	463	53	11,195	972	\$10.25
	Modoc (Siskiyou and Modoc Counties)								
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)	2,375	5,966	8,341	904	87	10,064	1,392	10.60
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)	2,595	1,903	4,498	780	290	10,017	2,504	7.14
	Tahoe (Sierra, Nevada, and Placer Counties)	435	436	871	125	28	1,361	176	9.56
	Eldorado (Eldorado, Placer, and Amador Counties)	851	2,760	3,611	416	48	11,773	844	6.75
	Stanislaus (Calaveras and Tuolumne Counties)	222	60	282	99	32	1,352	222	5.92
	Sierra (Mariposa, Madera, and Fresno Counties)	3,328	96	3,424	3,406	1,287	7,175	3,263	17.11
STATE LAND	Latour State Forest	23	133	156	14	1	46	23	15.91
	Blodgett Forest-Univ. of Calif.	108	346	454	23	5	142	93	5.46
	D. L. Bliss-Emerald Bay State Parks	301		301	371	30	518	301	23.22
	Calaveras Big Trees State Park	336	222	558	100	8	376	336	5.90
	Mountain Home State Forest	233		233	574	112	328		
ALL WORK DONE BY THE STATE COOPERATIVE PROJECT		Initial Work	5,610	5,337	10,947	5,043	1,399		
		Reeradication	6,087	6,620	12,707	2,225	581		
		Maint. Work	82		82	7	1		
		All	11,779	11,957	23,736	7,275	1,981		
WORK DONE BY THE FOREST SERVICE									
NATIONAL FOREST LAND	Mendocino	421		421	93	62	421	421	8.59
	Klamath								
	Shasta-Trinity	734	2,243	2,977	245	12	3,277	734	9.21
	Modoc								
	Lassen	1,101	697	1,798	538	120	4,606	820	8.10
	Plumas	1,883	1,778	3,661	1,234	381	8,044	1,701	9.66
	Tahoe	849	1,909	2,758	476	101	5,924	531	8.87
	Eldorado	1,969	2,751	4,720	634	113	11,044	1,969	5.03
	Stanislaus	2,288	1,029	3,317	927	317	11,896	2,288	6.83
	Sierra	2,442	633	3,075	2,064	726	8,777	2,442	15.60
Sequoia	676		676	665	103	1,807	580	13.73	
ALL WORK DONE BY THE FOREST SERVICE		Initial Work	5,389	1,173	6,562	3,124	863		
		Reeradication	6,672	9,867	16,539	3,663	1,065		
		Maint. Work	302		302	89	7		
		All	12,363	11,040	23,403	6,876	1,935		
WORK DONE BY THE NATIONAL PARK SERVICE									
NATIONAL PARK LAND	Lassen Volcanic	3,230	3,585	6,815	741	136	7,261	2,200	8.39
	Yosemite	4,828	535	5,363	3,707	255	22,535	1,218	9.18
	Sequoia-Kings Canyon	4,416		4,416	1,382	31	14,306		
ALL WORK DONE BY THE NATIONAL PARK SERVICE		Initial Work	2,646	1,923	4,569	1,140	235		
		Reeradication	3,173	2,197	5,370	2,663	130		
		Maint. Work	6,655		6,655	2,027	57		
		All	12,474	4,120	16,594	5,830	422		
ALL WORK DONE IN CALIFORNIA									
ALL OWNERSHIPS ALL AGENCIES		Initial Work	13,645	8,433	22,078	9,307	2,497		
		Reeradication	15,932	18,684	34,616	8,551	1,776		
		Maint. Work	7,039		7,039	2,123	65		
		All	36,616	27,117	63,733	19,981	4,338		

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Region 6

BR

REPORTS

Annual, 1956

(Pacific Northwest Region)

Portland, Oregon

ANNUAL REPORT OF BLISTER RUST CONTROL

IN THE PACIFIC NORTHWEST REGION

1956



By: Benton Howard
Forester

BR
REPORTS
Annual - 1956
(Pacific Northwest Region)

Region 6
Portland, Oregon
January 9, 1957

THE BLISTER RUST CONTROL PROGRAM

OREGON and WASHINGTON

1956

Three federal agencies, the U. S. Forest Service, the National Park Service and the Bureau of Land Management are protecting fire-needed pines from white pine blister rust on selected areas of federally owned lands. There are no state or privately owned white pine stands receiving such protection. The Oregon State Board of Forestry and the Oregon State Department of Agriculture cooperate by enforcing quarantines, inspecting horticultural nurseries and assisting with sugar pine regeneration problems.

The continued management of sugar pine and western white pine as commercial timber crops is depended on protecting them from white pine blister rust. This is done by the removal of the ribes (currants and gooseberries) from the stand and a bordering protection zone. All of the commercial stands being protected are in Southern Oregon. Specimen western white pine stands having aesthetic and recreational values are being protected on Mt. Rainier and Crater Lake National Parks.

Under the terms of the Lea Act, enacted by the Congress in 1940, the Forest Service provided leadership, technical direction and coordination of the program for all agencies.

SUMMARY - 1956

ACCOMPLISHMENT

Planned objectives were met. Ribes were eradicated from all Bureau of Land Management and Forest Service lands needing treatment. No ribes eradication was required on the National Park lands. Sufficient ribes surveys (checks) were made to insure that the 1956 work met standards and properly to plan the 1957 work.

Damage surveys were made on Mt. Rainier National Park and on limited areas of the Rogue River National Forest and on the Medford District of the Bureau of Land Management.

Work in 1956

RIBES ERADICATION

Agency	Acres Treated				Man Days	M Ribes Destroyed
	Initial	Re-erad.	Maintenance:	Total		
	Work	Work	Work			
FS	982	6,167	1,316	8,465	2,250	210
BLM	-	12,102	-	12,102	521	7
TOTAL	982	18,269	1,316	20,567	2,771	217

OTHER WORK

Agency	Acres Covered - Surveys				Trees Saved:	
	Ribes	Pine	Damage	Total	by	Man
					Pruning	Days
FS	11,764	-	1,451	13,215	1,629	456
BLM	12,102	2,360	640	15,102	4,790	474
NPS	-	-	1/ 4,500	1/4,500	-	45
TOTAL	23,866	2,360	6,591	32,817	6,419	975

1/ In Washington, rest of work is in Oregon.

Journal

Monday, Jan 1st. A fine day, with a light breeze from the north. The temperature was 45° at 10 AM. The wind died away at 2 PM, and a heavy fog came on. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far.

Jan 2nd

Tuesday, Jan 2nd. A fine day, with a light breeze from the north. The temperature was 45° at 10 AM. The wind died away at 2 PM, and a heavy fog came on. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far.

Wednesday, Jan 3rd. A fine day, with a light breeze from the north. The temperature was 45° at 10 AM. The wind died away at 2 PM, and a heavy fog came on. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far. The fog was very thick, and we could not see more than a few feet in front of us. We went out for a walk, but did not go far.

DEVELOPMENTS

The use of 2,4D herbicide in pellet form to kill ribes seedlings was tried on the Umpqua Forest. Results were encouraging and further tests will be made in 1957.

Pilot surveys to evaluate the extent of damage from blister rust were conducted on the Rogue River Forest. Procedures are being developed and damage surveys on extensive areas are planned for 1957.

Ribes eradication in conjunction with seed spotting of sugar pine was tried on 120 acres of clear cuts on the Umpqua Forest. Under certain circumstances combining these two types of work appears to be feasible, with resultant lower costs to both projects.

RESEARCH

The Pacific Northwest and the California Experiment Stations continued studies on blister rust and white pine problems.

Under the direction of the Siskiyou-Cascade Research Center, a special study was conducted on the Umpqua Forest to assist in determining on which clear cuts sugar pine is the best species to plant or seed spot. The results of this study should be available for use during the 1957 season.

Studies on the growth rate of cankers were continued and should be finished during the coming year. These will greatly aid in establishing techniques and procedures in saving infested trees by pruning diseased limbs.

The mass inoculation of sugar pine seedlings from seed collected at widely scattered areas to test resistance to blister rust was completed. Results will be known in 1957.

Studies on the influence of micro-climate on the spread and intensification of blister rust on local areas were continued.

The search for resistant white and sugar pine trees were intensified. Sixteen trees were located that appear to be resistant to blister rust. These will be re-examined in 1957 and suitable ones will be used as a source of seed or scion material in further studies. Twenty bushels of cones were collected from apparently resistant western white pines near the Champion Mines on the Umpqua Forest. Seedlings will be out-planted and tested to see if the resistance is transmitted from the parent.

In 1951 grafts of rust resistant white pines from Idaho were out-planted at Mill Creek on the Rogue River Forest and near Rhododendrom, Oregon. None of the grafted resistant stock has become infected, while all the controls, both planted and volunteer white pines are now infected with blister rust.

STATUS OF THE PROGRAM

During 1956 the exchange of lands between the Forest Service and the Bureau of Land Management to consolidate holdings and to alleviate administrative problems was consummated. As a result, 33,106 acres of control units, formerly managed by the Bureau of Land Management, are now the responsibility of the Siskiyou National Forest. The present status of the control areas by ownership is shown below:

STATUS OF CONTROL UNITS 1956

Land Ownership	Control Area		Worked Initially		Pre-maint. Work Remaining			
	Acres	Control Acres					Percent	
	of	White Pine		Percent			Acres	of Total
	White Pine	and Protec- tive Zone	Acres	Total	Acres	Acres	Maint.	Maint.
National Park	1/ 8,132	8,132	8,132	100	-	920	7,212	89
B L M O & C	48,845	50,032	48,761	98	1,271	26,313	22,448	45
Public Domain	1,463	1,627	1,617	99	10	467	1,150	71
Total	50,308	51,659	50,378	98	1,281	26,780	23,598	46
National Forest	97,482	103,586	95,899	93	7,687	66,310	29,589	29
State & Private	-	13,410	12,426	93	984	6,648	5,778	43
Total	1/ 155,922	176,787	166,835	94	9,952	100,658	66,177	37

1/ Includes 4500 acres in Mt. Rainier National Park in Washington. Rest of acreage is in Oregon.

For 1957

The resistant white pine work should be increased in scope and stepped up in tempo.

Damage surveys to evaluate rust conditions on specific areas will be devised. Surveys to determine the status of individual areas will be made.

The effectiveness of 2,4D herbicides in dry pellet form will be further tested.

The sugar pine management areas on the Siskiyou acquired as a result of the exchange of lands with the Bureau of Land Management will be appraised and management plans made.

The necessary ribes eradication work and ribes surveys will be done.

2000

PROJECT REPORTS

Forest Service

The continual growing of white pine crops is planned on some 97,000 acres of national forest lands located on the Umpqua, Siskiyou and Rogue River Forests of Southern Oregon. To protect the pines on these areas ribes must be kept suppressed on a total of more than 103,000 acres. The initial work is 93 percent complete and nearly a third of the total area is now on maintenance. During 1956, as a result of the exchange of lands between the Forest Service and the Bureau of Land Management, the Siskiyou Forest has acquired 33,106 acres of blister rust control units, formerly managed by the Bureau of Land Management. Pertinent records and data on these units have been secured from the Bureau of Land Management and transferred to the Siskiyou.

Most of the ribes eradication now being done is a result of regeneration caused by clear cuts or other disturbances. Thus, the scope of the yearly projects on the forests is largely determined by the cutting progress. The increase in planting and seed spotting and the addition of new areas of low rust activity that support adequate existing white pine reproduction keeps the project at essentially the same level as in proceeding years.

Organizations

On the Umpqua and Rogue River Forests, a staff officer from the Supervisor's office furnished direction, guidance and assistance to the districts in conducting the project. Forest work camps, Union Creek on the Rogue River and South Umpqua Falls on the Umpqua, served as bases of operation. The checkers and laborers were seasonal employees.

No work was done on the newly acquired management units on the Siskiyou, therefore, no blister rust control personnel were employed on this forest.

The 1956 Season

Ribes eradication was initially done on 982 acres, rework on 4,214 acres and maintenance work was done on 1,316 acres of the management units. An additional 2,101 acres were surveyed (checked) for ribes and found to require no work. Ribes on 38 acres were killed by the use of 2.4D and 2.4.5T herbicides. These chemicals were used on rock bound bushes and on dense concentrations of limited extent. For all classes of work, a total of 8,465 acres were covered.

The work was contracted on areas where ribes were generally present. Contracts were finished by 8 firms of contractors on 27 areas totaling 3,090 acres. The average bid price was \$5.54 per acre.

Forest employed crews did the work on 3,274 acres. The Umpqua employed from three to seven men and the Rogue River eight men during the season. The work was on small areas, areas with spotty ribes occurrence and on areas requiring maintenance work.

Two checkers were employed on the Umpqua and five on the Rogue River. Worked areas were checked to determine if the standards had been met and sufficient areas were also checked to allow for planning the 1957 work.

Some areas near Pinehurst were checked for the Bureau of Land Management on a reimbursement basis.

White Pine Management

The forests continued aggressive action in managing their areas for white pine production. Planting and seed spotting to sugar pine or western white pine was done on selected clear cuts.

On the Umpqua Forest sugar pine seed trees with excellent cone crops were left on 200 acres of clear cut. Rodent control was undertaken and it is hoped that natural regeneration will be secured. The forest has developed a comprehensive sugar pine management plan.

The Rogue River Forest now has over 1,000 acres in five-needled plantations on the Union Creek District. During 1956 in cooperation with the Cascade-Siskiyou Research Center, about 40 acres were sown with western white pine seed treated with WRL-2 in order to protect the seed from rodents. One acre was seed spotted, the remaining were broadcast sown. Seeding was done on both pumice and clay loam soils.

National Park Service

Selected white pine stands on Rainier and Crater Lake National Parks have been given protection from white pine blister rust. During 1956 no ribes eradication was needed on either park.

The 3,632 acres on Crater Lake Park are now on maintenance and no further ribes eradication is contemplated for many years. In four or five years, an examination for possible occurrence of blister rust in the control areas will be needed.

A survey of the 4,500 acres of control area in Rainier National Park to determine the amount of infection was made during the season. Ribes were not reduced to desired levels until 1948 and the degree of infection was related to that year.

The data indicate that while a high degree of protection has existed since then, very heavy infection had occurred prior to 1948.

Future costs to maintain control will be high and inasmuch as the uninfected white pines will eventually be a minor constituent of these stands, the Park Service is considering discontinuing control work.

Bureau of Land Management

The Bureau of Land Management plans to grow sugar pine as a commercial crop on some 48,845 acres of O & C lands and 1,463 acres of Public

Domain. To do this requires ribes suppression on a total of 59,895 acres. Initial work has been completed on 97 percent of the area and 48 percent is now on maintenance. As a result of the land exchange between the Bureau of Land Management and the Forest Service, the management areas are now all either O & C or Public Domain lands and national forest lands are no longer involved. Some 8,236 acres of private lands are in the protective zones.

Organization

A project superintendent attached to the District Forester's staff at Medford was in charge of the project. In former years the Siskiyou Forest rendered some facilitating services on a reimbursement basis. In 1956 the entire operation was handled by the Bureau of Land Management. Technical assistance and direction were provided by the Timber Management staff of the Forest Service Regional Office in Portland.

The 1956 Season

A seasonal camp was operated in the Trappers Cabin unit, employing a total of 17 men. Six men quit during the season to take better paying jobs. However, the planned work was accomplished. The crews covered 1,695 acres requiring ribes re-eradication and an additional 9,776 acres were checked and found to require no work. Jeep roads within the area greatly facilitated the work.

Six contracts were let during the season and five of them totaling 631 acres were completed at an average cost of \$6.35 per acre. One contract was in the Evans Creek unit, one in the Pickett Creek unit while the other four were in the Trappers Cabin unit. The contracts were for work on areas supporting numerous ribes.

Disease surveys were made on 640 acres of the Trappers Cabin unit and the data indicate that practically no new infection has occurred since the initial ribes eradication in 1950-52.

Sugar pine stocking and appraisal surveys were made on 2,360 acres.

Infection was pruned from 4,790 sugar pines at an expenditure of 79 man days.

Records and data concerning the former units were separated in line with the land exchange with the Forest Service. The data on the units as now constituted were summarized. Pertinent records on the acreage now the responsibility of the Siskiyou Forest were turned over to the Forest Service.

As a result of the exchange some boundary and area adjustments were made in order to form logical units for management. The acreage figure in Table 1 correctly show the present status of the units.

TABLE 1

STATUS OF RIBES ERADICATION BY OPERATING AGENCY
AND LAND OWNERSHIP IN THE PACIFIC NORTHWEST REGION

AS OF DECEMBER 31, 1956

		Acres Control Area				Required Future Work			
		In White	In Pro-	In	Acres	In-	Re-	erad-	Work
Control	Land	Owner-	Pine Mgt:	tection:	Control:	Worked	itial:	Re-	erad:
Operation	ship	Units	Zone	Unit	Initially:	Acres:	Acres	Acres	Acres
FOREST SERVICE									
Umpqua	:Nat.For:	9,730:	2,182:	11,912:	6,976:	4,936:	6,183:	793	
	:Contro.:	2,148:	1,239:	3,387:	730:	2,657:	595:	135	
	:Private:	-- :	96:	96:	-- :	96:	-- :	--	
	:Total :	11,878:	3,517:	15,395:	7,706:	7,689:	6,778:	928	
Rogue River	:Nat.For:	57,175:	150:	57,325:	57,231:	94:	44,181:	13,050	
	:Private:	-- :	2,934:	2,934:	2,907:	27:	2,907:	--	
	:Total :	57,175:	3,084:	60,259:	60,138:	121:	47,088:	13,050	
Siskiyou	:Nat.For:	28,429:	2,523:	30,952:	30,952:	-- :	15,351:	15,601	
	:Private:	-- :	2,154:	2,154:	2,154:	-- :	1,323:	831	
	:Total :	28,429:	4,677:	33,106:	33,106:	-- :	16,674:	16,432	
Total Forest Service	:Nat.For:	95,334:	4,855:	100,189:	95,159:	5,030:	65,715:	29,444	
	:Contro.:	2,148:	1,239:	3,387:	730:	2,657:	595:	135	
	:Private:	-- :	5,184:	5,184:	5,061:	123:	4,230:	831	
	:Total :	97,482:	11,278:	108,760:	100,950:	7,810:	70,540:	30,410	
BUREAU OF LAND MANAGEMENT									
Medford District	:O&C :	48,845:	1,187:	50,032:	48,761:	1,271:	26,313:	22,448	
	:P. Dom.:	1,463:	164:	1,627:	1,617:	10:	467:	1,150	
	:Nat.For:	-- :	10:	10:	10:	-- :	-- :	10	
	:Private:	-- :	8,226:	8,226:	7,365:	861:	2,418:	4,947	
	:Total :	50,308:	9,587:	59,895:	57,753:	2,142:	29,198:	28,555	
NATIONAL PARK SERVICE									
Crater Lake	:N.P.S. :	3,632:	-- :	3,632:	3,632:	-- :	-- :	3,632	
*Mt. Rainier	:N.P.S. :	4,500:	-- :	4,500:	4,500:	-- :	920:	3,580	
	:Total :	8,132:	-- :	8,132:	8,132:	-- :	920:	7,212	
ALL AGENCIES									
Regional Totals	:O&C :	48,845:	1,187:	50,032:	48,761:	1,271:	26,313:	22,448	
	:P. Dom.:	1,463:	164:	1,627:	1,617:	10:	467:	1,150	
	:Nat.For:	95,334:	4,865:	100,199:	95,169:	5,030:	65,715:	29,454	
	:Contro.:	2,148:	1,239:	3,387:	730:	2,657:	595:	135	
	:N.P.S. :	8,132:	-- :	8,132:	8,132:	-- :	920:	7,212	
	:Tot.Fed:	155,922:	7,455:	163,377:	154,409:	8,968:	94,010:	60,399	
	:Private:	-- :	13,410:	13,410:	12,426:	984:	6,648:	5,778	
	:Total :	155,922:	20,865:	176,787:	166,835:	9,952:	100,658:	66,177	

*In State of Washington

TABLE 2

1/ SUMMARY OF RIBES ERADICATION BY ALL AGENCIESPACIFIC NORTHWEST REGION -- 1956

		Acres					
		:Checked &:					
		: Meeting :					
Control		Class	Land	:Standards:	Total	M	
Operation		of	Owner-	: Without :	Man	Ribes	
		Work	ship	:Worked: Work	Total	Days	Destroyed
		:Nat.For.	635	104	739	309	17
		:Initial:Contro.	66	44	110	38	4
		:Private	133	--	133	82	6
		:Total	834	148	982	429	27
All Agencies		:Nat.For.	3,808	1,631	5,439	1,580	178
		:Contro.	117	--	117	82	3
		:Re-erad:O&C	2,326	9,776	12,102	521	7
		:Private	289	322	611	106	2
		:Total	6,540	11,729	18,269	2,289	190
		:Maint.	:Nat.For.	1,316	--	1,316	53
		:Nat.For.	5,759	1,735	7,494	1,942	195
		:Contro.	183	44	227	120	7
	:All	:O&C	2,326	9,776	12,102	521	7
		:Private	422	322	744	188	8
		:Total	8,690	11,877	20,567	2,771	217

TABLE 3

SUMMARY OF RIBES ERADICATION BY THE FOREST SERVICE

PACIFIC NORTHWEST REGION - 1956

		Acres					
		:Checked &:					
		: Meeting :					
Control	Class	Land	Standards	Total	Man	M	
Operation:	of	Owner-	Without			Ribes	
Work	ship	Worked:	Work	Total	Days	Destroyed	
	: Nat. For:	208:	104:	312:	96:	5	
	: Initial: Contro.:	66:	44:	110:	38:	4	
	: Total :	274:	148:	422:	134:	9	
Umpqua	: Nat. For:	393:	60:	453:	178:	9	
National	: Re-erad: Contro.:	117:	- :	117:	82:	3	
Forest	: Total :	510:	60:	570:	260:	12	
(Oregon)	: Nat. For:	601:	164:	765:	274:	14	
	: All : Contro.:	183:	44:	227:	120:	7	
	: Total :	784:	208:	992:	394:	21	
	: Nat. For:	427:	- :	427:	213:	12	
Rogue	: Initial: Private:	133:	- :	133:	82:	6	
River	: Total :	560:	- :	560:	295:	18	
National	: Nat. For:	3,415:	1,571:	4,986:	1,402:	169	
Forest	: Re-erad: Private:	289:	322:	611:	106:	2	
(Oregon)	: Total :	3,704:	1,893:	5,597:	1,508:	171	
	: Maint. : Nat. For:	1,316:	- :	1,316:	53:	-	
	: Nat. For:	5,158:	1,571:	6,729:	1,668:	181	
	: All : Private:	422:	322:	744:	188:	8	
	: Total :	5,580:	1,893:	7,473:	1,856:	189	
	: Nat. For:	635:	104:	739:	309:	17	
	: Initial: Contro.:	66:	44:	110:	38:	4	
	: Private:	133:	- :	133:	82:	6	
	: Total :	834:	148:	982:	429:	27	
	: Nat. For:	3,808:	1,631:	5,439:	1,580:	178	
Totals	: Re-erad: Contro.:	117:	- :	117:	82:	3	
	: Private:	289:	322:	611:	106:	2	
	: Total :	4,214:	1,953:	6,167:	1,768:	183	
	: Maint. : Nat. For:	1,316:	- :	1,316:	53:	-	
	: Nat. For:	5,759:	1,735:	7,494:	1,942:	195	
	: All : Contro.:	183:	44:	227:	120:	7	
	: Private:	422:	322:	744:	188:	8	
	: Total :	6,364:	2,101:	8,465:	2,250:	210	

TABLE 4

SUMMARY OF RIBES ERADICATION BY THE BUREAU OF LAND MANAGEMENTPACIFIC NORTHWEST REGION -- 1956

			Acres				
			:Checked &:				
			: Meeting :				
: Class : Land :			:Standards:			:Total:	
Control : of : Owner- :			: Without :			: Man :	
Operation: Work : ship :			Worked : Work : Total :			Days : Destroyed	
Medford							
District	:Re-erad:	O&C	: 2,326	: 9,776	:12,102	:521	: 7
(Oregon)	:Total	: O&C	: 2,326	: 9,776	:12,102	:521	: 7

TABLE 5

SUMMARY OF ERADICATION BY CONTRACTPACIFIC NORTHWEST REGION - 1956

	:	:	Acres	:	:	:	Average
	:	:	Worked	:	:	:	Thousands: Price Per
Control	:	:	by	:	:	:	of Ribes : Acres Paid to
Operation	:	Agency	Contractor	:	Man Days	:	Destroyed: Contractor
ALL WORKINGS (INITIAL AND RE-ERADICATION)							
Umpqua	:	:	182	:	141	:	8 : \$9.70
Rogue River	:	FS	2,908	:	953	:	123 : 5.28
Total	:	FS	3,090	:	1,094	:	131 : 5.54
Medford	:	BLM	631	:	237	:	6 : 6.35
Total	:	All	3,721	:	1,331	:	137 : 5.68
1956	:	:		:		:	:
Accumulative Totals	:	:	55,615	:	15,927	:	1,338 : \$4.99
1946 - 1956	:	:		:		:	:

THEORY OF THE
RELATIONSHIP BETWEEN
THE PHYSICAL AND CHEMICAL

The first part of the paper is devoted to a discussion of the physical and chemical properties of the system. The second part is devoted to a discussion of the relationship between the physical and chemical properties of the system.

THEORY OF THE RELATIONSHIP BETWEEN

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WHITE PINE BLISTER RUST CONTROL

REGIONS SEVEN and EIGHT

CALENDAR YEAR 1956



UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

WHITE PINE BLISTER RUST CONTROL IN THE EASTERN REGION

ANNUAL REPORT FOR 1956

United States Department of Agriculture

FOREST SERVICE

Region 7

Upper Darby, Pa.

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IMPORTANCE OF WHITE PINE

White pine extends from the foot-hills in New England to the higher mountain elevations in northern Georgia. It is highly regarded as a commercial species throughout this region. The supply of white pine timber of sawlog dimensions is in good demand although supply is relatively short. In New England, some white pine is being used by pulp and paper industries. Some of this comes from utilization of trees infected with blister rust, from pine tops and limbs, as chips produced from barked slabs or edgings and good young stands of promising saw-timber. The acreage of white pine sufficiently stocked to justify protection is slightly in excess of 7.3 million acres. This was a net increase of approximately thirty thousand acres of white pine resulting from surveys in 1956. A continual change is in progress in the composition of the forest. Reproduction produces new stands largely in old fields while cuttings or other disturbances frequently reduce the stocking of older stands so that they do not meet adequate standards for protection. The maturity value of the white pine scheduled for protection exceeds \$800 million dollars at prevailing stumpage prices.

White pine is an important timber resource in our fast growing economy. Special attention is given to the protection of the young stands in order to meet future demands for their lumber. White pine responds well to good management practices. Increasing interest is being shown by federal, state and private owners in the management of white pine stands.

The blister rust problem was created by nature and the cost of control is to a large extent governed by the natural distribution of ribes. From the viewpoint of immediate financial return present owners of young white pine, the timber crop of the future, have little incentive to invest money in protection. Because of the complexities of the problem, technical requirements for control and national need for adequate timber resources, protection of this resource is largely a public responsibility.

PURPOSE OF THE BLISTER RUST CONTROL PROGRAM

The purpose of the program is to establish and maintain control of the disease in white pine stands that show promise of sufficient value at maturity to warrant the added cost of blister rust control measures. Selection of stands to be protected is based on quality, quantity and age of the pine. The 7.3 million acres of white pine in the eastern region comprises approximately 2/3 of the total pine acreage in the U. S. designated for protection. About 10% is

federally-owned and 5% in state or other public ownership. The remaining 85% is distributed among some 220,000 private owners.

Control has been established on 89.6% of the present control area. The objective is to increase this acreage particularly in the states which are below the over-all average, maintain the control that has been established and protect new stands as they become a part of the forest.

DISEASE AND DAMAGE

In the region, control has progressed to the point where heavy damage from blister rust is seldom found. Of particular concern, however, is the loss of natural white pine reproduction that could be prevented through timely application of control measures. Such losses continue in sections where the control program is inadequately financed. Data from plot studies taken in white pine outside of the control area in northern New England during 1956 found as many as 50% of the stems to be infected with the rust.

Infection on ribes was generally heavy in northern New England but was retarded due to a late spring. It was also extremely heavy in Berkshire County, Massachusetts but light elsewhere in the state. New York reported the heaviest ribes infection in many years. In the Southern states climate ideal for the spread and intensification of the disease has been generally absent during the past few years. In Pennsylvania, West Virginia and Virginia infection was general and of medium intensity, especially late in the summer. In North Carolina a general survey revealed infection on ribes at only two locations; Watauga and Ash Counties.

ORGANIZATION AND COOPERATION

The Lea Act of April 26, 1940 (58 Stat. 168: 16 U.S.C. 594a) authorizes the Secretary of Agriculture to cooperate with states and other agencies in control of blister rust. The Act is implemented by the Forest Service in this region through the activities of 23 district leaders under the supervision of three area leaders. These men and a Cooperative Forest Pest Control Section in the Division of State and Private Forestry, Region 7, provide leadership and technical direction for blister rust control activities on lands of all ownerships. Numerous personnel changes occurred during the year as a result of three retirements. Section Chief William Clave retired after 32 years of service in blister rust in New England, New York, Pennsylvania and Region 7. District Leader L. E. Newman, Concord, New Hampshire retired in June after 40 years of service. George F. Richardson, Jr., District Leader, Lebanon, New Hampshire with nearly 36 years of service retired in October. The accompanying chart outlines the organization as a result of these changes.

PERMANENT FOREST PEST CONTROL PERSONNEL IN EASTERN REGION

REGIONAL FORESTER

R-7 DIVISION OF STATE & PRIVATE FORESTRY

SECTION - Forest Pest Control
Section Chief - G. R. Allison ✓
Asst. Section Chief - P. H. Simmonds ✓

M. R. Mulholland ✓
Area Leader
Maine - New Hampshire

District Leaders

H. G. Bradbury
Belfast, Me.

M. G. Calderara
Auburn, Me.

J. B. Pike ✓
Bridgton, Me.

S. H. Boomer
Conway, N. H.

W. S. Codman
Laconia, N. H.

S. D. Conner
Keene, N. H.

R. E. Curtis
Rochester, N. H.

F. U. Sievers ✓
Area Leader
Vt.-Mass.-Conn.-N.Y.

District Leaders

E. H. Palmer
St. Johnsbury, Vt.

F. H. Rose
Bellows Falls, Vt.

V. C. Lilley
Greenfield, Mass.

P. E. Barber
Saratoga Sprgs., N.Y.

J. W. Charlton
Gloversville, N. Y.

N. H. Harpp ✓
Warrensburg, N. Y.

H. W. Holcomb
Malone, N. Y.

R. M. Hick
Collaborator
Oneonta, N. Y.

A. V. Miller
Collaborator
Canaan, Conn.

J. R. George ✓
Area Leader
Pa. & So. App'l. States

District Leaders

M. J. Deberti ✓
Brookville, Penna.

R. P. Fetzinger
Harrisburg, Penna.

G. S. Cramer
Mt. Solon, Va.

SUPERVISORS
M. Q. Miller ✓
Staunton, Va.
C. A. Redamer
Harrisonburg, Va.

G. E. Keaton
Lerona, W. Va.

SUPERVISORS
C. M. Fultz
Lost River, W. Va.
D. L. Gillispie
Arboretale, W. Va.

W. A. Stegall, Jr. ✓
Asheville, N. C.

Twelve of the eighteen white pine producing states in Region 7 and 8 cooperated in the blister rust control program this year. No work was needed in the other six states, namely, Rhode Island, New Jersey, Delaware, Kentucky, South Carolina and Georgia. Funds are adequate and control work is progressing on schedule in most states as a result of excellent cooperation. During 1956 state and local agencies provided \$328,071 or approximately 51% of all funds chargeable to the program on state and private lands. The extent to which local agencies have cooperated in the blister rust control program over the years is indicated in Table 2A.

THE STATUS OF CONTROL

Control has been established on 15,665,925 acres or 89.6% of the present control area. This is an increase of 2.1% over last year. Partial control has been established on an additional 9.4%. Under some conditions control is established in one operation, although in most cases two or more workings at periodic intervals are required to bring ribes growth to an allowable minimum. When that point is reached control can be maintained through periodic inexpensive examinations to locate and remove ribes regeneration caused by fire, logging, construction, etc. Also prompt action is required to destroy any hazardous regeneration of ribes that may occur on limited natural ribes sites.

The following table shows the distribution of white pine among the various ownerships and briefly indicates the status of control.

Ownerships	Acres of White Pine	Acres of Control Area	Percent of Control Area	
			Initially Worked	On Maint- enance
State and Private Lands	6,160,617	15,456,782	98.8	88.7
National Forests	1,064,960	1,876,806	99.9	95.7
National Parks	78,558	155,751	100.0	98.3
Indian Lands	22	445	100.0	100.0
Total	7,304,157	17,489,784	99.0	89.6

(Further detail on the status of control is shown in tables 6 thru 8 of the appendix).

From the above figures it can be seen that the bulk of remaining

work is on state and private lands. It includes 179,317 acres requiring initial work and 1,561,493 acres that will need reworking before control is established. Control work on the National Forests includes 405 acres of initial work and 80,020 acres of rework. Only 2,624 acres of rework are needed on the National Parks. Activities on federally-owned lands are being performed on schedule. Maintaining control that has been established is rapidly becoming the major task. Experience to date indicates approximately 8% of the maintenance area examined requires intensive ribes eradication. Most of the eradication needed on maintenance area is due to disturbances such as logging or blowdown.

As control becomes established the need for large ribes eradication crews diminishes. Personnel skilled in determining pine values, rust conditions and eradication needs are essential to provide economical protection measures.

It is believed that additional knowledge concerning factors that influence ribes regeneration and growth might prove useful in solving a part of the maintenance problem. Mr. Clarence R. Quick, who has conducted studies in the ecology of western species of ribes spent some time in Region 7, examining ribes conditions. As a result of these observations a four step program was outlined as a suggested means for obtaining information useful in carrying on maintenance work. Conferences were held with district leaders in all areas with the purpose of compiling and disseminating basic information on ribes ecology of the Region. This with evaluation of earlier studies comprises the first step. The second step was also initiated. A habitat analysis form was prepared and used on a trial basis. A conference will be held early in 1957 to analyze the results. Methods and procedures for continuing the habitat study will be formulated for collecting and evaluating additional data. It is hoped that from these studies some basic information can be obtained which may be applied in a practical way toward reducing work-load and costs in the maintenance program. Steps three and four of the recommendations of Mr. Quick are a plant association study and establishment of long time study plots, which will receive further consideration after steps one and two have been tried and results evaluated.

CONTROL ACTIVITIES IN 1956

Summary of Accomplishments on Lands of All Ownerships

A total of 1,299,212 acres of control area was given attention in 1956. Of this 69,947 acres were initially worked and 414,865 acres including 54,915 acres of maintenance area were reworked. Examination of the remaining 814,400 acres revealed no intensive ribes eradication work was needed to maintain control previously established.

Skilled Men Needed for Survey Work

Year-round employees skilled in control area examinations and other critical phases of blister rust control work are becoming increasingly valuable to the program. This year New Hampshire joined the list of Connecticut, New York, Pennsylvania, North Carolina and Tennessee in providing sufficient full-time personnel for this important part of the control work. Many district leader personnel are anticipating retirement in the near future which places an even greater premium on availability of full time men, skilled in control practices.

Ribes Eradication Methods

Hand eradication methods are still used in a major portion of the control work since most of the ribes encountered are small size and in scattered locations. A large portion of the work is done by single scouts working alone. Two, three, and four man units are used in areas which require more intensive coverage.

The use of the Chemical 2, 4, 5-T in aqueous solution is considered practical in the treatment of concentrations of some species, and was used to some extent in Vermont, New York, Pennsylvania and Virginia. Over 1,100 acres were sprayed this year. In Maine and New Hampshire considerable spray work was done with light spray tanks in the course of scout work. Results on the whole have been satisfactory. The entire field of chemical eradication is open to further development of satisfactory formula, methods of application and suitable spray equipment. Tests will be made in Maine and New Hampshire in 1957 using a newly developed back pack mist blower on large concentrations. Equipment developed at the Massabesic Experimental Forest at Alfred, Maine for control of hardwood brush to release white pine will be used. Application of a concentrated solution of 2, 4, 5-T in water to cut stems and crowns of the large, deep-rooted bushes is proving satisfactory. A dry mixture of salt and borax also is widely used and is very effective.

Nursery Sanitation

There are 31 nurseries in the Region which produced approximately 20 million white pine during 1956. Under the Soil Bank Program expanded facilities will be required to meet the increased demand for white pine planting stock. Plans for expansion of present nurseries, reactivating others and establishing new nurseries are already under way in several states in the Region. The increased production of white pine planting stock under the Soil Bank Program is estimated at 35 million trees annually by 1960. Expansion of present sanitation zones and the establishment of control areas around new nurseries is expected to place additional responsibility for technical assistance and supervision

on the blister rust personnel. The greatly accelerated planting program will increase the need for technical assistance for control throughout the region. Twelve nurseries were examined in 1956 and eleven are scheduled for examination during 1957.

Canker Elimination

Canker elimination was performed in three districts in New York. A total of 8,485 pines were examined for blister rust cankers. Of this number 188 fatally infected trees were removed and 237 were treated for removal of 371 branch cankers. Thirty-five man-days were used. All work was on State Park and campsite areas.

Program Informational Activities

Radio, television, newspapers, meetings, show-me trips, demonstrations, exhibits and individual instruction were used to stimulate interest and bring blister rust information to the attention of pine owners. Three television stations in Pennsylvania showed blister rust films cleared for this purpose. Show-me trips and individual contacts prove most effective. Special effort was made during the year to work with county or farm foresters. This proved very beneficial to both blister rust and forest management. Increasing interest in blister rust control is evident in contacts with private, industrial, and all foresters interested in white pine management.

Classroom and field instruction concerning blister rust and its control was presented to forestry students at seven colleges and universities. Cooperation with State Foresters and their staff was maintained at a high level and many officials are showing greater interest in the planning and operation of the program.

WORK ON STATE AND PRIVATE LANDS

A very late spring delayed the start of eradication activities two to three weeks. It resulted in reduced accomplishments during the period that is usually most ideal for eradication work and interfered with late fiscal year program plans. Special effort during the remainder of the eradication season brought the calendar year accomplishments to normal. Labor was a problem in a few localized areas. Turnover due to wet weather was high in western Pennsylvania. Competition for labor was keen in a few localities in New Hampshire, Maine and Vermont. Inability to promptly fill personnel vacancies were responsible for reduced accomplishments in Massachusetts.

Twelve states participated in the program during 1956. Survey and eradication accomplishments are shown in tables 3, 4 and 5 of the Appendix.

Achievement to maintain control that has been established outweighed pre-maintenance eradication efforts again this year. A total of 791,631 acres on maintenance were examined. Conditions on all but 49,340 acres were found suitable to continue for another 5 to 10 years without intensive work at this time. Natural regeneration of ribes on the area previous to being placed on maintenance and the amount of disturbance since last working determines the interval between examinations. The small amount of control area requiring maintenance work (6.2% this year) is encouraging and indicates sound, effective control. In areas where logging or other disturbances are at a high level, intensive eradication may be necessary on 20-25% of the maintenance control area examined. Where disturbances are lacking usually only a small amount of ribes eradication is needed.

WORK ON NATIONAL FORESTS

Eleven National Forests in Region 7 and 8 have 1,876,806 acres of control area including 1,064,960 acres of white pine. Control work is performed as needed and all work is up-to-date. There has been a gradual cutback during the past few years in the amount of work required. The George Washington National Forest has the largest remaining work load. This is caused by the large amount of ribes-bearing acreage in the control area.

The White Mountain National Forest has a total of 2,242 acres of white pine. This year 1,890 acres of control area were examined and 509 acres of rework was performed. The entire control area of 5,536 acres is now on maintenance. No work is scheduled for 1957.

Control has been established on all of the 2,308 acres of control area on the Green Mountain National Forest. Future work will require a small amount of examination to determine ribes regeneration. Very little eradication work is anticipated.

The Allegheny National Forest with 4,085 acres of control including 957 acres of white pine is on maintenance with the exception of a small area of 115 acres in Forest County. Control can be maintained by infrequent periodic checks to determine ribes comeback.

On the George Washington National Forest, 74,767 acres were examined in 1956. A total of 1,190 acres were added to the control. Ribes eradication was performed on 13,009 acres of which 7,341 acres were pre-maintenance work. Remaining work besides maintaining control that has been established includes 345 acres of initial work and 56,814 acres of rework. The 1957 program of work will be similar to the work performed last year.

Of the 120,652 acres of control areas on the Jefferson National Forest all but 5,964 are on maintenance. During 1956 16,735 acres were examined, 458 acres were mapped and 44,996

ribes were destroyed on 2,089 acres of control area. Only 50 acres of the eradication were initial work. Of 17,184 acres on maintenance that were examined only 1,099 acres required extensive crew work. Plans call for the examination of 18,600 acres in 1957 with 1,800 acres to be mapped.

The Monongahela National Forest with 88,800 acres of control area including 47,347 acres of white pine is 87.2% on maintenance. A total of 4,158 acres in Pocahontas and Tucker Counties were examined and ribes eradication was performed on 1,037 acres. A total of 1,617 acres are scheduled for eradication in the spring of 1957.

On the North Carolina National Forests 8,044 acres were examined and 6,486 acres were added to the control area. A small amount of eradication work is scheduled for 1957. All but 3,156 acres of the 230,947 acres control area are on maintenance.

A total of 583 acres were added to the control area of the Cherokee National Forest thru surveys performed during 1956. All except 2,522 acres are on maintenance. A recheck for cultivated ribes is scheduled around Watauga Lake for next year. This land was recently transferred from T.V.A. to the Forest Service. White pine is to be planted on these areas.

The remaining National Forests that have white pine, the Cumberland, Sumter and Chattahoochee are so nearly ribes-free that only infrequent inspection are necessary.

WORK ON NATIONAL PARKS

The five National Parks in the region contain 155,751 acres of control area including 78,585 acres of white pine. All except 2,624 acres are on maintenance. Control of the rest is well in hand and work is scheduled as needed.

On the Acadia National Park all of the 16,872 acres of control area are on maintenance. About half of this was intensely burned in 1947 and is just now beginning to show the extent of pine and ribes regeneration. Observation of the burned area during 1956 indicates that white pine will predominate on some sites. Surveys to determine the ribes regeneration on part of the unburned area are scheduled for 1957.

The Saratoga Battlefield National Monument contains 955 acres of control area none of which is on maintenance. Re-working will be scheduled after an examination to determine the persistence of ribes regeneration.

On the Shenandoah National Park all the control area is on maintenance. Examination of 2,569 acres revealed 75 acres in need of eradication. An additional 200 acres of the Big Meadows area was chemically treated to destroy persistent ribes growing in heavy sod. A total of 2,105 acres are scheduled for examination in 1957.

No work was scheduled on the Blue Ridge Parkway in 1956. Approximately 1,700 acres in Virginia are scheduled for examination next year. New construction southwest of Asheville may involve some new control area along the Parkway. Consideration will be given to each section as it is completed.

Examination work on the Great Smoky Mountain National Park was of the formal post check type. A total of 4,861 acres were examined and ribes were destroyed during the post check activity. The work plan calls for the continuation of examination in the Cataloochee District. This involves 5,031 acres. Rework of 110 acres on Hazel Creek is scheduled for spring.

1957 PROGRAM GOALS

1. That federal participation in the blister rust program continue at the present level in leadership, National Forest and Cooperative control funds.
2. That the Forest Service Branch of Research continue to investigate the importance of eastern white pine and extend their investigations with respect to Regions 7 and 8.
3. Thru cooperation of the Northeastern Forest Experiment Station, Region Seven and field forces endeavor to solve some of the ribes ecology problems designed to aid in suppression of ribes.
4. In areas where an expansion of the program is needed, every effort will be made to increase the participation of state and local agencies.
5. That special efforts be continued toward complete modernization of the blister rust control transportation equipment.
6. That effort be made to increase the interest of participants in the planning and field operation of the control Program.



APPENDIX

Statistical Tables

Table 1 - Informational & Service Activities - 1956

State	Meetings Addressed		No. Radio Talks	No. Items Published	No. Demonstrations Placed	Show-Me Trips	Film Showings	
	No.	Attendance					No.	Attendance
Me.	18	449	0	8	10	18	2	55
N. H.	58	4,087	2	65	10	23	3	87
Vt.	10	258	1	20	6	12	8	246
Mass.	1	25	0	0	0	0	1	25
Conn.	1	23	0	0	0	0	1	23
N. Y.	42	1,310	1*	45	9	44	76	6,602
Pa.	9	168	0	8	1	2	11	781
Md.	0	0	0	0	0	0	0	0
Va.	3	71	0	0	4 **	8	2 +	115 +
W. Va.	1	50	0	1	0	12	2	50
N. Car.	2	23	0	0	0	4	0	0
Tenn.	0	0	0	0	0	1	0	0
Total	145	6,464	4	147	40	124	106	7,984

* Radio recording given by two state workers - Plattsburg Fair.

** BR Exhibits - Est. 7,575 persons attended.

+ Shown outside Area III (Florida and Texas).

Table 1. Summary of the data for the first 10 years of the study.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Mean	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2
SD	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Min	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Max	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5
Q1	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8
Q3	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6
Median	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Mode	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
Range	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5
Interquartile Range	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Skewness	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Kurtosis	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
------	------	------	------	------	------	------	------	------	------	------

The data for the first 10 years of the study are summarized in Table 1. The table shows the mean, standard deviation, minimum, maximum, quartiles, median, mode, range, skewness, and kurtosis for each year from 1990 to 2000. The data shows a general upward trend over the 10-year period, with the mean increasing from 1.2 in 1990 to 4.2 in 2000. The standard deviation also increased over time, indicating greater variability in the data. The minimum and maximum values also show an upward trend, with the minimum increasing from 0.0 to 1.0 and the maximum increasing from 2.5 to 5.5. The quartiles, median, and mode all show an upward trend as well. The range, skewness, and kurtosis also show an upward trend, with the range increasing from 2.5 to 5.5, the skewness increasing from 0.5 to 1.5, and the kurtosis increasing from 1.0 to 2.0.

Table 2 - Local Cooperation on Blister Rust Control

Work During 1956

State	No. of Cooperators			Amount Expended			
	Individ- uals	Towns	Counties	Individ- uals	Towns	Counties	Total
Me.	-	48	-	\$ -	\$ 11,532	\$ -	\$ 11,532
N. H.	2	85	-	137	25,462	-	25,599
Vt.	2	31	-	117	7,359	-	7,476
Conn.	-	2	-	-	2,431	-	2,431
N. Y.	-	-	18	-	-	19,694	19,694
Total	4	166	18	\$ 254	\$ 46,784	\$19,694	\$ 66,732

Local Cooperation on Blister Rust Control Work1918 - 1956 Inclusive

State	Individual Cooperation		Town Cooperation		County Cooperation	
	No. Cooperators	Amount Spent by Individual Cooperators	No. Town Appropri- ations or Con- tributions	Amount of Town Money Expended	No. County Appropri- ations or Allotments	Amount Spent by Counties
Me.	11,133	\$ 86,309	1,552	\$ 289,492	2	\$ 601
N. H.	705	51,927	2,631	821,801	6	1,724
Vt.	2,390	77,879	483	106,693	-	-
Mass.	21,975	119,354	73	28,358	-	-
R. I.	8	581	-	-	-	-
Conn.	527	12,670	218	47,229	-	-
N. Y.	5,990	177,157	39	10,831	263	304,020
Pa.	303	2,273	-	-	-	-
Va.	1	276	-	-	-	-
W. Va.	1	358	-	-	-	-
Total	43,033	\$ 528,784	4,996	\$1,304,404	271	\$306,345

1. 1. 1.	1. 1. 1.	1. 1. 1.	1. 1. 1.	1. 1. 1.	1. 1. 1.
1. 1. 2.	1. 1. 2.	1. 1. 2.	1. 1. 2.	1. 1. 2.	1. 1. 2.
1. 1. 3.	1. 1. 3.	1. 1. 3.	1. 1. 3.	1. 1. 3.	1. 1. 3.
1. 1. 4.	1. 1. 4.	1. 1. 4.	1. 1. 4.	1. 1. 4.	1. 1. 4.
1. 1. 5.	1. 1. 5.	1. 1. 5.	1. 1. 5.	1. 1. 5.	1. 1. 5.
1. 1. 6.	1. 1. 6.	1. 1. 6.	1. 1. 6.	1. 1. 6.	1. 1. 6.
1. 1. 7.	1. 1. 7.	1. 1. 7.	1. 1. 7.	1. 1. 7.	1. 1. 7.
1. 1. 8.	1. 1. 8.	1. 1. 8.	1. 1. 8.	1. 1. 8.	1. 1. 8.
1. 1. 9.	1. 1. 9.	1. 1. 9.	1. 1. 9.	1. 1. 9.	1. 1. 9.
1. 1. 10.	1. 1. 10.	1. 1. 10.	1. 1. 10.	1. 1. 10.	1. 1. 10.

1. 2. 1.	1. 2. 1.	1. 2. 1.	1. 2. 1.	1. 2. 1.	1. 2. 1.
1. 2. 2.	1. 2. 2.	1. 2. 2.	1. 2. 2.	1. 2. 2.	1. 2. 2.
1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
1. 2. 4.	1. 2. 4.	1. 2. 4.	1. 2. 4.	1. 2. 4.	1. 2. 4.
1. 2. 5.	1. 2. 5.	1. 2. 5.	1. 2. 5.	1. 2. 5.	1. 2. 5.
1. 2. 6.	1. 2. 6.	1. 2. 6.	1. 2. 6.	1. 2. 6.	1. 2. 6.
1. 2. 7.	1. 2. 7.	1. 2. 7.	1. 2. 7.	1. 2. 7.	1. 2. 7.
1. 2. 8.	1. 2. 8.	1. 2. 8.	1. 2. 8.	1. 2. 8.	1. 2. 8.
1. 2. 9.	1. 2. 9.	1. 2. 9.	1. 2. 9.	1. 2. 9.	1. 2. 9.
1. 2. 10.	1. 2. 10.	1. 2. 10.	1. 2. 10.	1. 2. 10.	1. 2. 10.

1. 2. 11. 1. 2. 11. 1. 2. 11. 1. 2. 11. 1. 2. 11. 1. 2. 11.

Table 3 - Surveys During 1956

| State | Ownership | Acreage of Control Area | | Total
Man-Days |
|---------|-----------------|-----------------------------|---------|-------------------|
| | | Examined for
Any Purpose | Mapped | |
| Maine | Nat'l Forest | 1,890 | 170 | 8 |
| Maine | State & Private | 163,776 | 113,229 | 1,365 |
| N. H. | State & Private | 407,305 | 148,951 | 2,301 |
| Vt. | State & Private | 68,302 | 27,732 | 428 |
| Mass. | State & Private | 118,609 | 58,662 | 381 |
| Conn. | State & Private | 51,241 | 24,794 | 283 |
| N. Y. | State & Private | 412,436 | 170,351 | 3,144 |
| Pa. | State & Private | 128,088 | 22,162 | 525 |
| Md. | State & Private | 520 | 307 | 4 |
| Va. | Nat'l Forest | 87,110 | 3,914 | 404 |
| Va. | State & Private | 104,043 | 105 | 229 |
| Va. | Nat'l Parks | 2,569 | - | 79 |
| W. Va. | Nat'l Forest | 8,550 | 32 | 45 |
| W. Va. | State & Private | 93,687 | 25,502 | 582 |
| N. Car. | Nat'l Forest | 8,044 | 113 | 35 |
| N. Car. | State & Private | 6,155 | - | 27 |
| N. Car. | Nat'l Park | 4,861 | - | 221 |
| Tenn. | Nat'l Forest | 583 | - | 2 |
| Tenn. | State & Private | 365 | - | 4 |
| TOTALS | State & Private | 1,554,527 | 591,795 | 9,273 |
| | Nat'l Forest | 106,177 | 4,229 | 494 |
| | Nat'l Parks | 7,430 | - | 300 |
| | All | 1,668,134 | 596,024 | 10,067 |

TABLE 4

RIBES ERADICATION WORK DURING 1956

| State
National Forest
National Park | First Work | | | Rework | | | Maintenance Work | | | All Work | | | Acres
Per
Man Day | Per Acre Values | |
|--|---------------------------------------|---------|----------|---------|-----------|----------|------------------|---------|----------|----------|-----------|----------|-------------------------|-----------------|-------|
| | Acres | Ribes | Man Days | Acres | Ribes | Man Days | Acres | Ribes | Man Days | Acres | Ribes | Man Days | | Man Days | Ribes |
| | | | | | | | | | | | | | | | |
| Me.
N. H.
Vt.
Mass.
Conn.
N. Y.
Pa.
Md.
Va.
W. Va. | Ribes Eradication on S&P Lands | | | | | | | | | | | | | | |
| | 14,178 | 46,790 | 341 | 76,453 | 167,194 | 1,415 | 796 | 17,359 | 48 | 91,427 | 231,343 | 1,804 | 50.7 | .019 | 2.5 |
| | 10,693 | 88,957 | 279 | 146,374 | 331,592 | 2,113 | 1,268 | 53,248 | 167 | 158,335 | 473,797 | 2,559 | 61.9 | .016 | 2.9 |
| | 11,410 | 53,478 | 560 | 18,017 | 59,566 | 775 | 9,749 | 43,358 | 397 | 39,176 | 156,402 | 1,732 | 22.6 | .044 | 3.9 |
| | 761 | 8,128 | 75 | 11,080 | 38,046 | 323 | 349 | 13,284 | 37 | 12,190 | 59,458 | 435 | 28.0 | .035 | 4.8 |
| | - | - | - | - | - | - | 8,141 | 66,319 | 266 | 8,141 | 66,319 | 266 | 30.6 | .032 | 8.1 |
| | 21,993 | 171,395 | 990 | 76,879 | 446,284 | 3,220 | 19,634 | 200,079 | 844 | 118,506 | 817,758 | 5,054 | 23.4 | .042 | 6.9 |
| | 7,001 | 19,416 | 191 | 3,807 | 6,919 | 43 | 7,328 | 46,160 | 542 | 18,136 | 72,495 | 776 | 23.3 | .042 | 3.9 |
| | 307 | 3,841 | 24 | 477 | 21,840 | 83 | - | - | - | 784 | 25,681 | 107 | 7.3 | .136 | 32.7 |
| | 1,897 | 15,195 | 247 | 2,149 | 25,241 | 391 | 1,512 | 15,618 | 257 | 5,558 | 56,054 | 895 | 6.2 | .161 | 10.0 |
| | 145 | 4,804 | 29 | 14,932 | 129,946 | 1,974 | 563 | 1,897 | 63 | 15,640 | 136,647 | 2,066 | 7.5 | .132 | 8.7 |
| Totals-State & Private | 68,385 | 412,004 | 2,736 | 350,168 | 1,226,628 | 10,337 | 49,340 | 457,322 | 2,621 | 467,893 | 2,095,954 | 15,694 | 29.8 | .033 | 4.4 |
| White Mountain - Me.
Monongahela W. Va.
Geo. Washington W. Va.
Geo. Washington Va.
Jefferson - Va. | Ribes Eradication on National Forests | | | | | | | | | | | | | | |
| | - | - | - | 509 | 554 | 15 | - | - | - | 509 | 554 | 15 | 33.9 | .029 | 1.0 |
| | 32 | 3,246 | 17 | 588 | 919 | 48 | 417 | 458 | 26 | 1,037 | 4,623 | 91 | 11.3 | .087 | 4.4 |
| | - | - | - | 1,884 | 10,037 | 247 | 20 | 36 | 3 | 1,904 | 10,073 | 250 | 7.6 | .131 | 5.2 |
| | 1,480 | 23,137 | 265 | 5,861 | 28,438 | 1,045 | 3,764 | 14,180 | 505 | 11,105 | 65,755 | 1,815 | 6.1 | .163 | 5.9 |
| | 50 | 3,421 | 14 | 940 | 14,990 | 185 | 1,099 | 26,585 | 212 | 2,089 | 44,996 | 411 | 5.0 | .196 | 21.5 |
| Totals National Forests | 1,562 | 29,804 | 296 | 9,782 | 54,938 | 1,540 | 5,300 | 41,259 | 746 | 16,644 | 126,001 | 2,582 | 6.4 | .155 | 7.5 |
| Shenandoah - Va. | Ribes Eradication on National Parks | | | | | | | | | | | | | | |
| | - | - | - | - | - | - | 275 | 2,664 | 25 | 275 | 2,664 | 25 | 11.0 | .090 | 9.6 |
| Me.
N. H.
Vt.
Mass.
Conn.
N. Y.
Pa.
Md.
Va.
W. Va. | Ribes Eradication on All Lands | | | | | | | | | | | | | | |
| | 14,178 | 46,790 | 341 | 76,962 | 167,748 | 1,430 | 796 | 17,359 | 48 | 91,936 | 231,897 | 1,819 | 50.5 | .019 | 2.5 |
| | 10,693 | 88,957 | 279 | 146,374 | 331,592 | 2,113 | 1,268 | 53,248 | 167 | 158,335 | 473,797 | 2,559 | 61.8 | .016 | 2.9 |
| | 11,410 | 53,478 | 560 | 18,017 | 59,566 | 775 | 9,749 | 43,358 | 397 | 39,176 | 156,402 | 1,732 | 22.6 | .044 | 3.9 |
| | 761 | 8,128 | 75 | 11,080 | 38,046 | 323 | 349 | 13,284 | 37 | 12,190 | 59,458 | 435 | 28.0 | .035 | 4.8 |
| | - | - | - | - | - | - | 8,141 | 66,319 | 266 | 8,141 | 66,319 | 266 | 30.6 | .032 | 8.1 |
| | 21,993 | 171,395 | 990 | 76,879 | 446,284 | 3,220 | 19,634 | 200,079 | 844 | 118,506 | 817,758 | 5,054 | 23.4 | .042 | 6.9 |
| | 7,001 | 19,416 | 191 | 3,807 | 6,919 | 43 | 7,328 | 46,160 | 542 | 18,136 | 72,495 | 776 | 23.3 | .042 | 3.9 |
| | 307 | 3,841 | 24 | 477 | 21,840 | 83 | - | - | - | 784 | 25,681 | 107 | 7.3 | .136 | 32.7 |
| | 3,427 | 41,753 | 526 | 8,950 | 68,669 | 1,621 | 6,650 | 59,047 | 999 | 19,027 | 169,469 | 3,146 | 6.0 | .165 | 8.9 |
| | 177 | 8,050 | 46 | 17,404 | 140,902 | 2,269 | 1,000 | 2,391 | 92 | 18,581 | 151,343 | 2,407 | 7.7 | .129 | 8.1 |
| Total | 69,947 | 441,808 | 3,032 | 359,950 | 1,281,566 | 11,877 | 54,915 | 501,245 | 3,392 | 484,812 | 2,224,619 | 18,301 | 26.4 | .037 | 4.6 |

Table 5 - Maintenance Activities During 1956

| State | Ownership | Total
Acreage
Examined | Portion Requiring Intensive Control Measures | | | | | Per Acre Values | |
|--------|-----------------|------------------------------|--|------------------------------|-------------|--------------------------|-------------|-----------------|--|
| | | | Number
Acres
Worked | Number
Ribes
Destroyed | Man
Days | Acres
Per
Man Days | Man
Days | Ribes | |
| Maine | State & Private | 34,773 | 796 | 17,359 | 48 | 16.5 | .060 | 21.8 | |
| Maine | National Forest | 689 | - | - | 15 | - | - | - | |
| N. H. | State & Private | 107,797 | 1,268 | 53,248 | 167 | 7.5 | .131 | 41.9 | |
| Vt. | State & Private | 21,573 | 9,749 | 43,358 | 397 | 24.5 | .040 | 4.4 | |
| Mass. | State & Private | 86,659 | 349 | 13,284 | 37 | 9.4 | .106 | 38.0 | |
| Conn. | State & Private | 24,794 | 8,141 | 66,319 | 266 | 30.6 | .032 | 7.1 | |
| N. Y. | State & Private | 300,101 | 19,634 | 200,079 | 844 | 23.2 | .042 | 10.1 | |
| Pa. | State & Private | 98,738 | 7,328 | 46,160 | 542 | 13.5 | .073 | 6.2 | |
| W. Va. | State & Private | 24,460 | 563 | 1,897 | 63 | 8.9 | .111 | 3.3 | |
| W. Va. | Nat'l Forest | 5,632 | 437 | 494 | 29 | 15.0 | .066 | 1.0 | |
| Va. | State & Private | 92,736 | 1,512 | 15,618 | 257 | 5.8 | .169 | 10.3 | |
| Va. | Nat'l Forest | 68,794 | 4,863 | 40,765 | 717 | 6.7 | .147 | 8.3 | |
| Va. | Nat'l Park | 2,569 | 275 | 2,664 | 25 | 11.0 | .090 | 9.6 | |
| Total | State & Private | 791,631 | 49,340 | 457,322 | 2,621 | 16.7 | .059 | 9.4 | |
| " | Nat'l Forest | 75,115 | 5,300 | 41,259 | 761 | 6.9 | .143 | 7.7 | |
| " | Nat'l Park | 2,569 | 275 | 2,664 | 25 | 11.0 | .090 | 9.6 | |
| All | | 869,315 | 54,915 | 501,245 | 3,407 | 16.1 | .061 | 9.1 | |

TABLE 6

STATUS OF BLISTER RUST CONTROL WORK IN PRESENT NET CONTROL AREA IN THE EASTERN REGION BY STATES AND DISTRICTS - SEPTEMBER 30, 1956

| State | District | Total Control Area | Acreage of White Pine | Net Acreage Worked | | Acreage | | In Control Area | | | Percentage of Net | | | Control Area | | | Maintenance | Attention |
|-------------|------------------|--------------------|-----------------------|--------------------|-------------|--------------------|-----------------|---------------------------|------------|-----------|-------------------|---------|--------|----------------|-------|--------|-------------|-----------|
| | | | | Initial | Maintenance | Now On Maintenance | No Further Work | Requiring No Further Work | First Work | Rework | Maintenance | Initial | Worked | On Maintenance | First | Rework | Maintenance | Attention |
| | | | | | | | | | | | | | | | | | | |
| Maine | Bradbury | 700,304 | 217,442 | 633,230 | 33,326 | 460,021 | - | - | 67,074 | 173,209 | 460,021 | 90.5 | 4.7 | 65.6 | 9.5 | 24.7 | 65.6 | |
| | Calderara | 753,677 | 302,718 | 730,771 | 4,037 | 573,781 | 18,444 | - | 22,906 | 156,990 | 555,337 | 97.0 | .5 | 76.1 | 3.0 | 20.8 | 73.6 | |
| | Pike | 793,231 | 397,730 | 793,231 | 13,134 | 663,535 | 93,192 | - | - | 129,696 | 570,343 | 100.0 | 1.6 | 83.6 | - | 16.3 | 71.9 | |
| N. H. | Totals for State | 2,247,212 | 917,890 | 2,157,232 | 50,497 | 1,697,337 | 111,636 | 89,980 | 89,980 | 459,895 | 1,585,701 | 96.0 | 2.2 | 75.5 | 4.0 | 20.4 | 70.5 | |
| | Boomer | 357,213 | 157,712 | 357,213 | 7,919 | 241,176 | - | - | - | 116,037 | 241,176 | 100.0 | 2.2 | 67.5 | - | 32.4 | 67.5 | |
| | Codman | 624,453 | 286,586 | 623,867 | 22,315 | 496,175 | - | - | 586 | 127,692 | 496,175 | 99.9 | 3.5 | 79.4 | .1 | 20.4 | 79.4 | |
| Vt. | Conner | 740,938 | 369,227 | 740,938 | 19,769 | 736,864 | - | - | - | 4,074 | 736,864 | 100.0 | 2.6 | 99.4 | - | .5 | 99.4 | |
| | Curtis | 786,417 | 405,616 | 786,417 | 7,909 | 657,424 | 262,446 | - | - | 128,993 | 394,978 | 100.0 | 1.0 | 83.5 | - | 16.4 | 50.2 | |
| | Totals for State | 2,509,021 | 1,221,141 | 2,508,435 | 57,912 | 2,131,639 | 262,446 | 586 | 586 | 376,796 | 1,869,193 | 99.9 | 2.3 | 84.9 | .1 | 15.0 | 74.4 | |
| Mass. | Palmer | 281,050 | 67,539 | 245,407 | 34,210 | 184,995 | - | - | 35,643 | 60,412 | 184,995 | 87.4 | 12.1 | 65.8 | 12.6 | 21.4 | 65.8 | |
| | Rose | 455,638 | 114,789 | 439,066 | 6,758 | 381,895 | 6,804 | - | 16,572 | 57,171 | 375,091 | 96.4 | 1.4 | 83.8 | 3.6 | 12.5 | 82.3 | |
| | Totals for State | 736,688 | 182,328 | 684,473 | 40,968 | 566,890 | 6,804 | 52,215 | 52,215 | 117,583 | 560,086 | 93.0 | 5.5 | 76.9 | 7.0 | 15.9 | 76.0 | |
| R. I. | Illy | 1,452,996 | 601,085 | 1,452,535 | 4,987 | 1,391,904 | 777,430 | - | 461 | 60,631 | 614,474 | 99.9 | .3 | 95.7 | .1 | 4.1 | 42.2 | |
| | Totals for State | 1,477,778 | 644,018 | 1,477,778 | 104,440 | 1,477,778 | 1,477,778 | - | - | - | - | 100.0 | 70.7 | 100.0 | - | - | - | |
| | Miller | 460,609 | 99,407 | 460,522 | 291,335 | 460,522 | 245,598 | 87 | 87 | - | 214,924 | 99.9 | 63.2 | 99.9 | - | - | 46.6 | |
| N. Y. | Barber | 676,006 | 178,969 | 674,314 | 179,261 | 573,980 | 1,460 | 1,460 | 1,692 | 100,334 | 572,520 | 99.8 | 26.5 | 84.9 | .2 | 14.8 | 84.6 | |
| | Charlton | 437,490 | 130,595 | 436,955 | 31,000 | 370,384 | 465 | - | 535 | 66,571 | 369,919 | 99.8 | 7.0 | 84.6 | .2 | 15.2 | 84.5 | |
| | Harpp | 605,135 | 285,849 | 605,135 | 308,883 | 587,192 | - | - | - | 17,943 | 587,192 | 100.0 | 61.0 | 97.0 | - | 2.9 | 97.0 | |
| N. J. | Hick | 221,622 | 44,616 | 220,012 | 23,241 | 169,128 | - | - | 1,610 | 50,884 | 169,128 | 99.3 | 10.4 | 76.3 | .7 | 22.9 | 76.3 | |
| | Holcomb | 223,365 | 74,226 | 221,730 | 26,670 | 182,660 | 3,340 | - | 1,635 | 39,070 | 179,320 | 99.3 | 11.9 | 81.7 | .7 | 17.4 | 80.2 | |
| | Western N. Y. | 138,003 | 25,670 | 128,196 | 11,328 | 59,522 | - | - | 11,807 | 66,674 | 59,522 | 91.4 | 8.2 | 43.1 | 8.6 | 48.4 | 43.1 | |
| N. J. | Totals for State | 2,301,621 | 739,925 | 2,284,342 | 580,383 | 1,942,866 | 5,265 | 17,279 | 17,279 | 341,476 | 1,937,601 | 99.3 | 25.2 | 84.4 | .7 | 14.8 | 84.1 | |
| | Totals for State | 16,742 | 3,771 | 16,742 | - | 16,742 | 16,742 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| | DeBerti | 153,172 | 30,159 | 151,497 | 26,813 | 135,032 | 34,308 | 1,675 | 1,675 | 16,465 | 100,724 | 98.9 | 17.5 | 88.2 | 1.1 | 10.7 | 65.8 | |
| Penn. | Fatzinger | 323,651 | 75,660 | 322,674 | 46,426 | 311,345 | 17,402 | 977 | 977 | 11,329 | 293,043 | 99.7 | 14.3 | 96.2 | .3 | 3.5 | 90.6 | |
| | Totals for State | 476,823 | 105,819 | 474,171 | 73,239 | 446,377 | 51,710 | 2,652 | 2,652 | 27,794 | 394,667 | 99.4 | 15.4 | 93.6 | .6 | 5.8 | 82.8 | |
| | Totals for State | 6,186 | 242 | 6,186 | - | 6,186 | 6,186 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| Del. | Totals for State | 164,866 | 70,858 | 164,866 | - | 152,444 | 54,553 | - | - | 12,422 | 97,891 | 100.0 | - | 92.5 | - | 7.5 | 59.4 | |
| | Totals for State | 146,314 | 48,179 | 146,314 | - | 146,314 | 146,309 | - | - | - | 105 | 100.0 | - | 100.0 | - | - | .1 | |
| | Keaton | 673,277 | 330,334 | 673,277 | 3,107 | 552,817 | 172,031 | - | - | 120,460 | 380,766 | 100.0 | .5 | 82.1 | - | 17.9 | 56.6 | |
| Va. | Cramer | 2,071,359 | 803,645 | 2,055,742 | 31,368 | 1,944,642 | 452,139 | 15,617 | 15,617 | 111,100 | 1,492,593 | 99.2 | 1.5 | 93.9 | .8 | 5.4 | 72.0 | |
| | Stegall | 674,355 | 544,478 | 674,355 | - | 674,015 | 674,015 | - | - | 340 | - | 100.0 | - | 99.9 | - | .1 | - | |
| | Stegall | 1,641,966 | 736,727 | 1,641,121 | - | 1,634,790 | 1,600,746 | 845 | 845 | 6,371 | 34,004 | 99.9 | - | 99.6 | .1 | .4 | 2.0 | |
| S. C. | Stegall | 130,870 | 64,192 | 130,870 | - | 130,870 | 130,870 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| | Stegall | 1,631,101 | 770,118 | 1,631,101 | - | 1,621,832 | 1,603,770 | - | - | 9,269 | 16,062 | 100.0 | .1 | 99.4 | - | .6 | 1.1 | |
| | Totals for State | 17,489,784 | 7,304,157 | 17,310,062 | 1,238,236 | 15,665,925 | 6,465,928 | 179,722 | 179,722 | 1,644,137 | 9,199,997 | 99.0 | 7.1 | 89.6 | 1.0 | 9.4 | 52.6 | |
| Grand Total | Totals for State | 2,301,621 | 739,925 | 2,284,342 | 580,383 | 1,942,866 | 5,265 | 17,279 | 17,279 | 341,476 | 1,937,601 | 99.3 | 25.2 | 84.4 | .7 | 14.8 | 84.1 | |
| | Totals for State | 16,742 | 3,771 | 16,742 | - | 16,742 | 16,742 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| | DeBerti | 153,172 | 30,159 | 151,497 | 26,813 | 135,032 | 34,308 | 1,675 | 1,675 | 16,465 | 100,724 | 98.9 | 17.5 | 88.2 | 1.1 | 10.7 | 65.8 | |
| Fenn. | Fatzinger | 323,651 | 75,660 | 322,674 | 46,426 | 311,345 | 17,402 | 977 | 977 | 11,329 | 293,043 | 99.7 | 14.3 | 96.2 | .3 | 3.5 | 90.6 | |
| | Totals for State | 476,823 | 105,819 | 474,171 | 73,239 | 446,377 | 51,710 | 2,652 | 2,652 | 27,794 | 394,667 | 99.4 | 15.4 | 93.6 | .6 | 5.8 | 82.8 | |
| | Totals for State | 6,186 | 242 | 6,186 | - | 6,186 | 6,186 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| Del. | Totals for State | 164,866 | 70,858 | 164,866 | - | 152,444 | 54,553 | - | - | 12,422 | 97,891 | 100.0 | - | 92.5 | - | 7.5 | 59.4 | |
| | Totals for State | 146,314 | 48,179 | 146,314 | - | 146,314 | 146,309 | - | - | - | 105 | 100.0 | - | 100.0 | - | - | .1 | |
| | Keaton | 673,277 | 330,334 | 673,277 | 3,107 | 552,817 | 172,031 | - | - | 120,460 | 380,766 | 100.0 | .5 | 82.1 | - | 17.9 | 56.6 | |
| Va. | Cramer | 2,071,359 | 803,645 | 2,055,742 | 31,368 | 1,944,642 | 452,139 | 15,617 | 15,617 | 111,100 | 1,492,593 | 99.2 | 1.5 | 93.9 | .8 | 5.4 | 72.0 | |
| | Stegall | 674,355 | 544,478 | 674,355 | - | 674,015 | 674,015 | - | - | 340 | - | 100.0 | - | 99.9 | - | .1 | - | |
| | Stegall | 1,641,966 | 736,727 | 1,641,121 | - | 1,634,790 | 1,600,746 | 845 | 845 | 6,371 | 34,004 | 99.9 | - | 99.6 | .1 | .4 | 2.0 | |
| S. C. | Stegall | 130,870 | 64,192 | 130,870 | - | 130,870 | 130,870 | - | - | - | - | 100.0 | - | 100.0 | - | - | - | |
| | Stegall | 1,631,101 | 770,118 | 1,631,101 | - | 1,621,832 | 1,603,770 | - | - | 9,269 | 16,062 | 100.0 | .1 | 99.4 | - | .6 | 1.1 | |
| | Totals for State | 17,489,784 | 7,304,157 | 17,310,062 | 1,238,236 | 15,665,925 | 6,465,928 | 179,722 | 179,722 | 1,644,137 | 9,199,997 | 99.0 | 7.1 | 89.6 | 1.0 | 9.4 | 52.6 | |

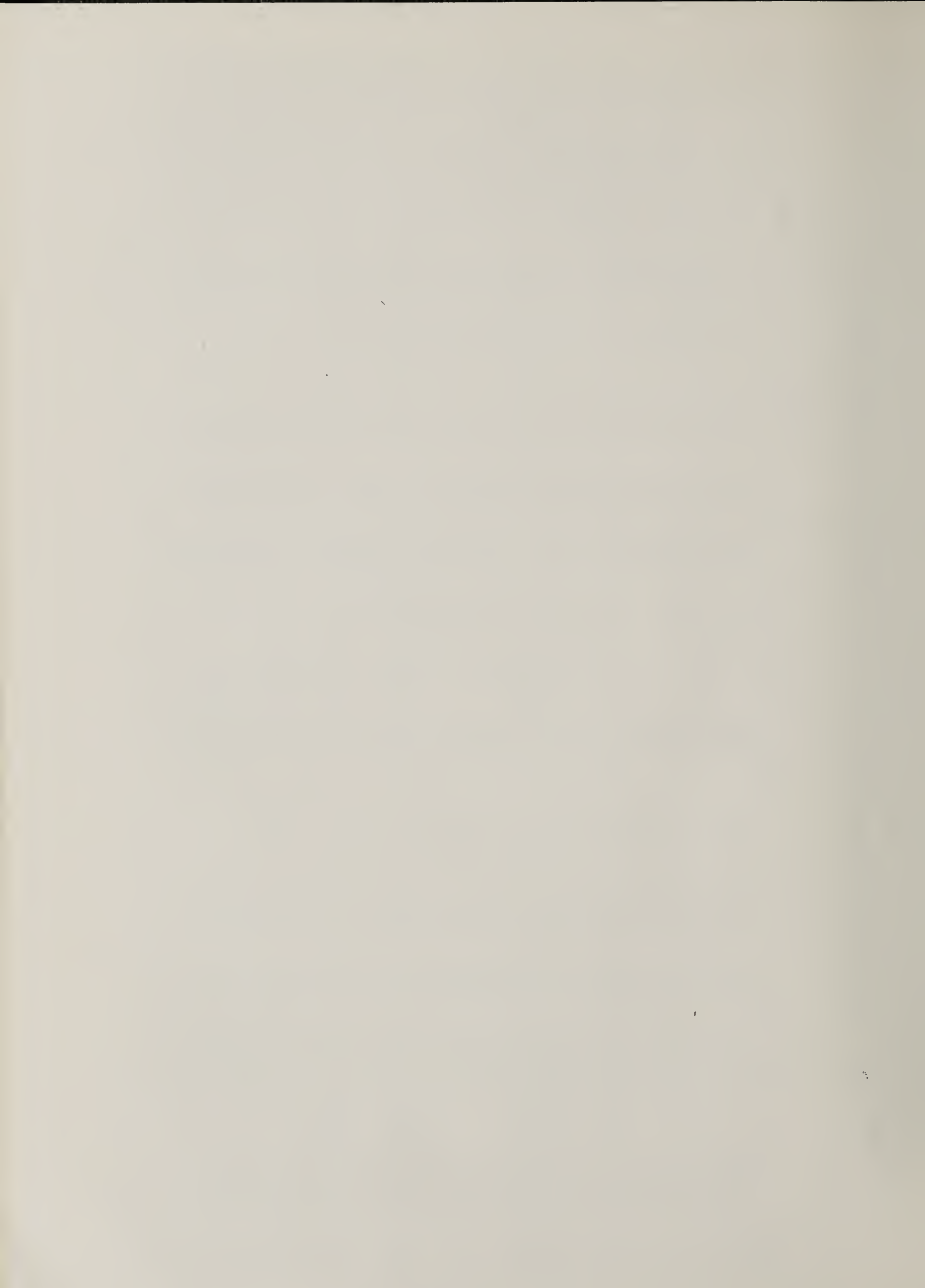


TABLE 7

STATUS OF BLISTER RUST CONTROL, BY STATES AND OWNERSHIP CLASSES, IN THE NET CONTROL AREA OF THE EASTERN REGION - SEPTEMBER 30, 1956

| State | Land Ownership | Total Control Area | Acreage of White Pine | Net Increase Worked | | Acreage In Net Control Area | | Percentage Of Net Control Area | | | | Control Area | | | | |
|--------------|----------------------|--------------------|-----------------------|---------------------|-------------|-----------------------------|---------------------------|--------------------------------|-----------|-------------|--------------|----------------|---------------------------|------------|--------|-------|
| | | | | Initial Work | Maintenance | Now On Maintenance | Requiring No Further Work | Needing Further Attention | | Worked | | On Maintenance | Needing Further Attention | | | |
| | | | | | | | | First Work | Rework | Maintenance | Initial Work | | Maintenance | First Work | Rework | |
| Maine | State and Private | 2,228,088 | 913,733 | 2,138,108 | 41,650 | 1,578,213 | 111,636 | 89,980 | 459,895 | 1,566,577 | 95.9 | 1.8 | 75.5 | 4.1 | 20.6 | 70.3 |
| N. H. | " | 2,505,737 | 1,219,856 | 2,505,151 | 56,572 | 2,128,355 | 262,446 | 586 | 376,796 | 1,865,909 | 99.9 | 2.2 | 84.9 | .1 | 15.0 | 74.4 |
| Vt. | " | 734,380 | 181,784 | 682,165 | 40,968 | 564,582 | 6,804 | 52,215 | 117,583 | 557,778 | 92.3 | 5.5 | 76.8 | 7.2 | 16.0 | 75.9 |
| Mass. | " | 1,452,996 | 601,085 | 1,452,525 | 4,987 | 1,391,904 | 777,430 | 461 | 60,631 | 614,474 | 99.9 | 0.3 | 95.7 | .1 | 4.1 | 42.2 |
| Conn. | " | 460,609 | 99,407 | 460,522 | 291,335 | 1,942,866 | 245,598 | 87 | - | 214,924 | 99.9 | 63.2 | 99.9 | .1 | - | 46.5 |
| N. Y. | " | 2,300,666 | 739,759 | 2,283,387 | 580,383 | 1,942,866 | 5,265 | 17,279 | 340,521 | 1,937,601 | 99.3 | 25.2 | 84.4 | .7 | 15.0 | 84.2 |
| N. J. | " | 16,742 | 3,771 | 16,742 | - | 16,742 | 16,742 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| Pa. | " | 472,738 | 104,862 | 470,086 | 72,999 | 442,407 | 51,710 | 2,652 | 27,679 | 390,697 | 99.4 | 15.4 | 93.6 | .6 | 1.6 | 82.6 |
| R. I. | " | 147,778 | 64,018 | 147,778 | 104,440 | 147,778 | 147,778 | - | - | - | 100.0 | 70.7 | 100.0 | - | - | - |
| Del. | " | 6,186 | 6,186 | 6,186 | - | 6,186 | 6,186 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| Ky. | " | 114,312 | 31,199 | 114,312 | - | 114,312 | 114,282 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| Wd. | " | 164,866 | 70,858 | 164,866 | - | 152,444 | 54,553 | - | 12,422 | 97,891 | 100.0 | - | 92.5 | - | 7.5 | 59.4 |
| Va. | " | 1,503,972 | 547,530 | 1,488,700 | 11,385 | 1,426,624 | 440,569 | 15,272 | 62,076 | 986,055 | 98.9 | 0.7 | 94.8 | 1.1 | 4.1 | 65.6 |
| W. Va. | " | 512,137 | 239,949 | 512,137 | 1,962 | 418,187 | 142,798 | - | 93,950 | 275,389 | 100.0 | 0.3 | 81.7 | - | 18.3 | 53.8 |
| Ga. | " | 324,452 | 248,576 | 324,452 | - | 324,452 | 324,452 | - | 150 | - | 100.0 | - | 99.9 | - | - | - |
| N. Car. | " | 1,368,452 | 582,911 | 1,367,667 | - | 1,364,624 | 1,361,653 | 785 | 3,043 | 2,971 | 99.9 | - | 99.7 | .1 | .2 | .2 |
| S. Car. | " | 77,008 | 45,398 | 77,008 | - | 77,008 | 77,008 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| Tenn. | " | 1,065,663 | 465,679 | 1,065,663 | - | 1,058,916 | 1,042,155 | - | 6,747 | 16,761 | 100.0 | - | 99.4 | - | .6 | 1.6 |
| Sub-Total | State and Private | 15,456,782 | 6,160,617 | 15,277,465 | 1,206,781 | 13,715,972 | 5,188,915 | 179,317 | 1,561,493 | 8,527,057 | 98.8 | 7.8 | 88.7 | 1.2 | 10.1 | 55.2 |
| N. & N. H. | White Mountain | 5,536 | 2,242 | 5,536 | 1,240 | 5,536 | - | - | - | 5,536 | 100.0 | 22.3 | 100.0 | - | - | 100.0 |
| Vt. | Green Mountain | 2,308 | 544 | 2,308 | - | 2,308 | - | - | - | 2,308 | 100.0 | - | 100.0 | - | - | 100.0 |
| Pa. | Allegheny | 4,085 | 957 | 4,085 | 240 | 3,970 | - | - | 115 | 3,970 | 100.0 | 5.8 | 97.1 | - | 2.8 | 97.2 |
| Ky. | Cumberland | 32,002 | 16,980 | 32,002 | - | 32,002 | 31,927 | - | - | 75 | 100.0 | - | 100.0 | - | - | - |
| Va. | Jefferson | 120,652 | 62,289 | 120,652 | 3,308 | 114,688 | 9,008 | - | 5,964 | 105,680 | 100.0 | 2.7 | 95.0 | - | 4.9 | 87.6 |
| W. Va. | Geo. Washington | 503,025 | 233,369 | 502,680 | 15,908 | 445,866 | 7,188 | 345 | 56,814 | 438,678 | 99.9 | 3.1 | 88.6 | .1 | 11.3 | 87.2 |
| Ga. | Monongahela | 88,800 | 47,347 | 88,800 | 867 | 77,481 | 24,607 | - | 11,319 | 52,874 | 100.0 | 0.9 | 87.2 | - | 12.7 | 59.5 |
| N. Car. | Chattahoochee | 349,903 | 295,902 | 349,903 | - | 349,713 | 349,713 | - | 190 | - | 100.0 | - | 99.9 | - | .1 | .4 |
| S. Car. | National Forest | 230,947 | 136,365 | 230,887 | - | 227,791 | 228,987 | 60 | 3,096 | 904 | 99.9 | - | 98.6 | .1 | 1.3 | - |
| Tenn. | Sumter | 53,862 | 18,794 | 53,862 | - | 53,862 | 53,862 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| | Cherokee | 485,686 | 250,171 | 485,686 | - | 485,164 | 481,863 | - | 2,522 | 1,301 | 100.0 | - | 99.5 | - | .5 | .3 |
| Sub-Total | National Forests | 1,876,806 | 1,064,960 | 1,876,401 | 21,563 | 1,796,381 | 1,185,055 | 405 | 80,020 | 611,326 | 99.9 | 1.1 | 95.7 | .1 | 4.3 | 32.6 |
| Me. | Acadia | 16,872 | 3,200 | 16,872 | 8,847 | 16,872 | - | - | - | 16,872 | 100.0 | 52.4 | 100.0 | - | - | 100.0 |
| N. Y. | Saratoga Battlefield | 955 | 166 | 955 | - | - | - | - | 955 | - | 100.0 | - | - | - | 100.0 | - |
| Va. | Shenandoah | 14,270 | 3,080 | 14,270 | 1,045 | 14,270 | - | - | - | 14,270 | 100.0 | 7.3 | 100.0 | - | - | 100.0 |
| W. & N. Car. | Blue Ridge | 13,663 | 6,042 | 13,663 | - | 12,104 | 11,761 | - | 1,559 | 343 | 100.0 | - | 88.5 | - | 11.4 | 25.5 |
| N.C. & Tenn. | Great Smoky | 109,991 | 66,070 | 109,991 | - | 109,881 | 79,752 | - | 110 | 30,129 | 100.0 | - | 99.9 | - | - | 27.4 |
| Sub-Total | National Parks | 155,751 | 78,558 | 155,751 | 9,892 | 153,127 | 91,513 | - | 2,624 | 61,614 | 100.0 | 6.4 | 98.3 | - | 1.7 | 37.5 |
| Cherokee | Indian Lands | 445 | 22 | 445 | - | 445 | 445 | - | - | - | 100.0 | - | 100.0 | - | - | - |
| Grand Total | All Ownerships | 17,489,784 | 7,304,157 | 17,310,062 | 1,238,236 | 15,665,925 | 6,465,928 | 179,722 | 1,644,137 | 9,199,997 | 99.0 | 7.1 | 89.6 | 1.0 | 9.4 | 52.6 |

**TABLE 8 - TOTAL FEDERAL, STATE AND LOCAL EXPENDITURES FOR
ALL BLISTER RUST CONTROL ACTIVITIES DURING 1956**

| STATE | F E D E R A L | | | | STATE AND
LOCAL
COOPERATION | GRAND
TOTAL |
|---------|-----------------|-------------------------|--------------------------------|-------------------|-----------------------------------|----------------|
| | FOREST SERVICE | | | NATIONAL
PARKS | | |
| | LEADER-
SHIP | WORK ON
S&P
LANDS | WORK ON
NATIONAL
FORESTS | | | |
| ME. | \$ 28,674 | \$ 20,666 | \$ 232 | \$ — | \$ 27,393 | \$ 76,965 |
| N. H. | 45,686 | 28,490 | — | — | 43,535 | 117,711 |
| VT. | 21,485 | 12,666 | — | — | 15,194 | 49,345 |
| MASS. | 8,849 | 4,439 | — | — | 10,691 | 23,979 |
| CONN. | 581 | 1,727 | — | — | 12,631 | 14,939 |
| N. Y. | 41,701 | 29,635 | — | — | 167,539 | 238,875 |
| PA. | 18,650 | 3,645 | — | — | 17,669 | 39,964 |
| MD. | 609 | 701 | — | — | 1,061 | 2,371 |
| VA. | 17,917 | 7,187 | 40,969 | 2,237 | 9,383 | 77,693 |
| W. VA. | 12,798 | 18,169 | 6,069 | — | 20,210 | 57,246 |
| N. CAR. | 428 | — | — | 4,841 | 1,565 | 6,834 |
| TENN. | 328 | — | — | — | 1,200 | 1,528 |
| TOTAL | \$ 197,706 | \$ 127,325 | \$ 47,270 | \$ 7,078 | \$328,071 | \$ 707,450 |

REGIONAL OFFICE COSTS ARE INCLUDED IN THE ABOVE AND PRORATED BY STATES.

**TABLE 9 - BREAKDOWN OF STATE AND LOCAL COOPERATIVE EXPENDITURES
AND CONTRIBUTED SERVICES DURING 1956**

| STATE | C A S H E X P E N D I T U R E S | | | | | V A L U E O F
C O N T R I B U T E D
S E R V I C E S | | STATE
INDIRECT
AID | TOTAL |
|---------|-----------------------------------|----------|----------|------------------|---------------|---|------------------|--------------------------|-----------|
| | STATE | TOWNS | COUNTIES | INDIVID-
UALS | SUB-
TOTAL | STATE | COUNTY | | |
| | | | | | | | TOWN
INDIVID. | | |
| ME. | \$ 13,861 | \$11,532 | \$ — | \$ — | \$ 25,393 | \$ 1,000 | \$ — | \$ 1,000 | \$ 27,393 |
| N.H. | 17,036 | 25,462 | — | 137 | 42,635 | 420 | — | 480 | 43,535 |
| VT. | 5,340 | 7,359 | — | 117 | 12,816 | 300 | — | 2,078 | 15,194 |
| MASS. | 8,671 | — | — | — | 8,671 | 400 | — | 1,620 | 10,691 |
| CONN. | 9,900 | 2,431 | — | — | 12,331 | — | — | 300 | 12,631 |
| N.Y. | 123,370 | — | \$19,694 | — | 143,064 | 16,273 | — | 8,202 | 167,539 |
| PA. | 13,949 | — | — | — | 13,949 | 1,080 | — | 2,640 | 17,669 |
| MD. | 811 | — | — | — | 811 | 100 | — | 150 | 1,061 |
| VA. | 7,683 | — | — | — | 7,683 | 300 | — | 1,400 | 9,383 |
| W. VA. | 18,110 | — | — | — | 18,110 | 1,400 | — | 700 | 20,210 |
| N. CAR. | 1,565 | — | — | — | 1,565 | — | — | — | 1,565 |
| TENN. | 1,200 | — | — | — | 1,200 | — | — | — | 1,200 |
| TOTAL | \$ 221,496 | \$46,784 | \$19,694 | \$ 254 | \$288,228 | \$21,273 | — | \$18,570 | \$328,071 |

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Region 9

ANNUAL REPORT

FOREST PEST CONTROL

NORTH CENTRAL REGION

CALENDAR YEAR 1956

Division of State & Private Forestry
Forest Pest Control Section
In Cooperation With
Federal, State, County and Local Agencies



Milwaukee, Wisconsin
February, 1957

ANNUAL REPORT

FOREST PEST CONTROL, NORTH CENTRAL REGION

Calendar Year 1956

Organization

Effective July 1, 1956, the Blister Rust Control Section in the Division of State and Private Forestry took on the federal responsibility for cooperative work on other major forest pests on state and private lands, and became the Forest Pest Control Section. Several organizational changes took place. The Section consists of two branches: Forest Insect Control, and Forest Disease Control. Mr. Kroeber, Assistant Regional Leader, heads up the Forest Insect Control. The vacancy in Forest Disease Control is expected to be filled in 1957.

Mr. Kouba, former Area II Leader, transferred to the Section of Reforestation in connection with Soil Bank activities. His position will be filled on February 10, 1957 by transfer of Mr. Doerner from the Central States Forest Experiment Station at Columbus, Ohio. Mr. Doerner is a former member of the BRC organization who transferred from the District Leader's position at Columbus, Ohio to the Central States Forest Experiment Station at Columbus. The only other major change was moving Area III Leader Nelson from East Lansing, Michigan to Lansing, Michigan where he occupies space in the office of C. A. Boyer, Chief of the State Bureau of Plant Industry.

The accompanying Organization Chart shows the organization as it existed during most of 1956. It does not reflect the changes described above.

Responsibility

The Section is concerned with cooperative forest pest control. In blister rust control the Section is responsible for leadership, coordination and technical direction of the program on lands of all ownerships, under the Lea Act of 1940, and state laws. Under the Forest Pest Control Act of 1947 the Section carries out federal responsibilities in cooperation with the states for work on state and private lands. The function of the Section is to help create awareness of forest pest problems, and to coordinate and expedite control measures where more than one state or agency are involved. All control work is done under authority of state laws under the direction of the state agency responsible. The Forest Pest Control Act provides for federal financial participation in cooperative forest pest control work when states request it. It is the responsibility of the Section to ascertain the biological and economic aspects of proposed projects by consulting with Forest Experiment Stations and forest managers,

submitting project proposals requesting financial aid, drawing up cooperative agreements with the states, assisting them in preparing work plans, and rendering such assistance in the field and elsewhere to assure the successful operation of control projects.

Spread of Major Pests in 1956

Blister rust is widespread, ranging from very heavy in the north, to very light in the south. Pine infection was reported for the first time in 1956 from Hancock County, Illinois, Franklin County in Iowa, and Mower and Dodge Counties in Minnesota.

Jack pine budworm was especially severe in northwestern Wisconsin and central Minnesota. Spruce budworm was present and spreading in northern Minnesota near the Canadian border. Larch sawfly did damage and is increasing in the north, especially in Minnesota. Saratoga spittlebug continued to be present in plantations of jack and red pine in the three Lake States. European pine shoot moth was particularly severe in red pine plantations in lower Michigan, northern Ohio, and northern Indiana. It was also found in southeastern Wisconsin. The tip weevil continued to be damaging, especially in open grown plantations of white, jack, red pine and norway spruce in the northern parts of Minnesota, Wisconsin and Michigan. It is scarce or absent in southern Wisconsin, Michigan, and in Indiana, Ohio and Illinois. The weevil is not severe on pines under a high deciduous overstory of 40% or more density.

Oak wilt is present and killing oaks, especially the red oak group, in the region where oaks occur. Dutch elm disease was found for the first time in Wisconsin in six southeastern counties, including Milwaukee. To date 63 known cases have been found and destroyed. A vigorous campaign was waged by the State Entomologist and local authorities in Milwaukee to clean up dying elms and to spray completely elms in the vicinity of Dutchelm diseased trees in order to destroy the European elm bark beetle, chiefly instrumental in spreading the disease.

Accomplishments in 1956

Forest Pests Other Than Blister Rust

The Section engaged actively in discharging its newly assigned duties by participating in forest pest meetings, assisting with surveys, and in general acquainting states and other agencies with the cooperative features of the Forest Pest Control Act.

Three cooperative projects for the control of the jack pine budworm were initiated in Minnesota and Wisconsin and preliminary plans laid for control operations in 1957.

Section personnel for the most part continued their work on white pine blister rust control; hence this report deals principally with blister rust.

White Pine Blister Rust Control

Surveys - 1956

As a result of surveys, both pre-eradication and post-check, as shown in Table 1, the control problem in 1956 was increased by the addition of 16,703 acres of white pine, chiefly as natural reproduction in Michigan and Wisconsin. Survey work was done principally by the permanent organization before and after the ribes eradication season.

Local Control, 1956

As shown in Table 2, over 40,300 acres of white pine were protected by the removal of 1,800,000 ribes from 98,700 acres of control area, using 13,800 man-days. In 1956 spring was late in coming, and there was an unusual amount of lost time due to rain during the summer. As a result less acreage was cleared of ribes than in 1955.

Most of the ribes eradication work was done by hourly paid labor furnished by owners, and supervised by crew leaders employed on state or federal funds. In Michigan most of the work on state and private lands continued to be effectively done using prison trustees, supervised by state or federal crew leaders. Prison trustees were successfully used in Minnesota for the first time. Ribes eradication contracts were let in Lower Michigan National Forest.

Most of the ribes eradication work was by uprooting bushes, but increasingly chemicals were used. All of the local control in Illinois continued to be done by basal spraying with 2,4,5-T in oil. Dense growths of swamp ribes were killed by 2,4,5-T in water as a foliage spray in Michigan, Minnesota and Wisconsin. For the first time in this Region power spray equipment was used to kill ribes in swamps on the Menominee Indian Reservation.

A large scale cooperative control program was engineered and successfully completed by Kouba in the Wisconsin Dells area of Wisconsin. Young white pines, mostly aesthetic, grow in profusion here. Through a local BRC committee, two counties, several municipalities, and many pine owners raised funds for control work. Crews were supervised by men employed on state and federal funds. To stimulate interest six \$25.00 government bonds were contributed by a local bank to be given to winners of a white pine essay contest for grade and high school students. Meetings and "show-me" trips were held. In all, about 6,500 acres of municipal and private lands were cleared of ribes.

Checking, 1956

Checking for ribes after eradication showed that satisfactory work was done. Of the 93,544 acres worked and checked, all but 116 acres were satisfactory. This is shown in Table 3. Approximately 5,200 acres worked were not officially checked because they were found to be ribes-free when worked.

Canker Pruning, 1956

Cankers were removed to save 6,593 infected pines growing in protected stands, and 1,066 fatally infected pines were removed in Iowa, Michigan, Minnesota and Wisconsin. (Table 6).

Nursery Sanitation, 1956

Ribes were removed from around three state-owned nurseries, all in Wisconsin. (Table 7). Ribes-free conditions are being maintained around 42 nurseries producing about 30 million white pine annually in the Region. As the Soil Bank Act gets into operation, it is anticipated the need for nursery sanitation will increase.

Status of Control, 1956

The total control problem in the Region consists of 1,279,766 acres of white pine, and 3,739,541 acres of control area. This is a slight increase over 1955. (Tables 4 and 5). At year's end 86.2% of the Regional control area has been initially worked, and 45.6% is on maintenance. As time goes on, more and more attention will have to be given to acreages on maintenance to keep them in a protected condition.

The major problem of control is in Michigan, Wisconsin and Minnesota. Nearly all of the natural white pine, and much of the planted are in these States, and the rust is most active and prevalent here. In Ohio, Indiana and Illinois white pine is extensively planted and grows well, often 4 feet in height per year. Due largely to hot, dry summers and early fall, rust is inhibited, and the danger of rust damage is much less than further north. The biggest problem of control in the three Lake States is in Minnesota, with only 71.2% initially worked, and 22.8% on maintenance, compared with about 89% initially worked, and 47% on maintenance in Wisconsin and Michigan. (Table 4). In general, ribes are more abundant and eradication costs are higher in Minnesota than elsewhere in the Region. Weather conditions in northeastern Minnesota are very favorable for rust development.

On the basis of ownership classes, control work is fairly well on schedule on national forests, and Indian Reservations, but lags on state and county lands, and is far behind on private lands. This is important, because of the total control acreage 62% is private, 25% state, county and municipal. 9% is in national forests, and 4% is in Indian Reservations. The status by ownership classes taken from Table 5 is as follows:

| | | | | |
|---------------------|-------|-------------------|-------|----------------|
| Private lands | 83.0% | initially worked, | 40.2% | on maintenance |
| State, County lands | 89.7% | " | " | , 41.7% " " |
| National Forests | 93.5% | " | " | , 68.4% " " |
| Ind. Reservations | 96.7% | " | " | , 78.6% " " |

For a graphic expression of the status of control by ownerships, see Chart 2 in the 1955 report.

Economic Study of White Pine

A start was made in 1956 for a much needed economic study of eastern white pine. Through a plan outlined by Dave King, Forest Economist heading up the study in Washington, D. C., Area and District Leaders took data in the fall of 1956 on pine infection in relation to rust hazard classes and ribes abundance on over 600 sample 0.3 acre plots selected at random in the 200,000 acres of pine protected 1952 to 1956. Records of these samples have been sent to Washington for analysis.

Work Plans

Long-term work plans for national forests, Indian Reservations, and some state forests have been prepared and are being followed. Long-range plans for other state and private lands have been prepared. While they cannot be followed because funds are uncertain, these plans are valuable as a basis for advising such owners, and for the orderly planning of control activities for such funds as are made available.

Informational Activities

It is the responsibility of this Section to keep the public informed about blister rust and other forest pest control. This is done through the usual media of disseminating information; radio, TV, newspapers, movies, posters, talks, etc. Several radio appearances, talks before forestry classes, newspaper articles, blister rust control movies, show-me trips and meetings were conducted during 1956. Many personal contacts were made by regular personnel in connection with survey work, and the development of concerted community effort in control work. The major effort is aimed at helping the pine owner help himself.

Other Forest Pest Control Work, 1956

While no cooperative insect control projects were in operation in 1956, three projects for the control of jack pine budworm on state and private lands have been proposed by the states, approved by the Lake States Experiment Station, the Regional office and Washington for operation in 1957. These are:

1. Northwestern Wisconsin, 195,200 acres, cost \$390,400, Fed. share \$97,600
2. Oneida County, Wis., 10,600 acres, cost \$23,850, Federal share \$5,962
3. Central Minnesota, 100,000 acres, cost \$200,000, Federal share \$50,000

It is proposed that these projects, administered by the states, will consist of aerial spraying of DDT at the rate of 1 pound per acre.

Prior to operation sessions will be held by Minnesota and Wisconsin entomologists in cooperation with the Division of Forest Insect Investigations for the purpose of training our own and state personnel in necessary survey techniques, both pre- and post-spraying, calibrating the planes, defining areas to be treated, etc. In these, our first cooperative control projects under the Forest Pest Control Act of 1947, it is highly important that they operate as smoothly and efficiently as possible.

Other Work

Permanent personnel continued to assist pathologists in their work of developing strains of white pine resistant to the rust, by suggesting places for out-planting test trees, by inspecting and caring for plantings, and by keeping watch for resistant trees in nature.

The study of micro-climate started by Dr. Van Arsdel four years ago, continued by Dr. Parmeter in 1955, and resumed by Dr. Van Arsdel on his release from the army last September, is an important, direct aid to rust control efforts. Our field personnel, especially in Wisconsin, assisted by helping select suitable places for this study, and working with Dr. Van Arsdel on this project.

Personnel Employed by Months, 1956

In Table 8, the approximate number of man-months employed by months and agencies is shown. The average per month (total for the 12 months divided by 12) is the same as man-years. There was a total of 93.7 man-years of work, of which 41.1 man-years were employed on state and private funds. This indicates the strong cooperative nature of the blister rust control project. Practically 83% of the total man-months is used for ribes eradication during the growing season, and only 17% is used the remainder of the year. During the fall and winter months the small nucleus of year-round personnel makes pre-eradication and post-check surveys, brings control records up to date, contacts pine owners, writes reports, and prepares work plans for the ensuing eradication season.

Costs, 1956

Total funds for blister rust control in 1956 were greater than in 1955, due primarily to increased state and private participation. State and local contributions, \$141,800, the highest ever, were \$13,800 higher than in 1955, which was in turn the highest. In 1956 the state contributions were over two and one-half times the federal matching funds for cooperative work.

Safety

Safety precautions were stressed at all times. Salt tablets were made available for use in hot weather. Crews were equipped with first aid material, and a first aid set is carried in each government car.

Recommendations

It is recommended that:

1. Continued effort be made to interest private owners of valuable white pines to protect them against blister rust as a necessary part of white pine management.
2. Close ties with Farm and Service Foresters be established and maintained so they will be familiar with blister rust and other major forest pest control measures, and will encourage private forest owners to practice necessary forest protection.

3. Cooperative relations be maintained with other branches of the Forest Service for mutual assistance in state and private forestry. This is of special importance in view of impetus for planting and forest management in A.C.P. and Soil Bank activities.
4. Forest Pest Control personnel continue to learn more of major forest pests and their control so they may be of greater use in developing and operating cooperative forest pest control projects.
5. Forest Pest Control personnel work closely with and assist investigative units dealing with the development of resistant strains of white pine, micro-climate studies of the rust and the application of improved herbicides to ribes.
6. Men be trained and encouraged to take ribes eradication contracts.
7. Every possible assistance be given to the economic study of eastern white pine.
8. Grades for District Leaders be adjusted, and funds be provided for needed full-time assistants to enable District Leaders to carry out their increased job load under their added responsibilities of forest pest control.
9. Safety measures continue to be stressed to accomplish the goal of no accidents.

UNITED STATES FOREST SERVICE
Regional Office Milwaukee, Wisconsin
A. W. GREELEY - Regional Forester

STATE DEPARTMENTS
of
AGRICULTURE AND
CONSERVATION

Division of State & Private Forestry
J. K. VESSEY - Chief
Forest Pest Control Section
Henry N. Putnam - Leader
John K. Kroeber - Asst. Leader, Forest Insect Control
Vacancy - Asst. Leader - Forest Disease Control

UNITED STATES
INDIAN SERVICE

AREA I
MINNESOTA
St. Paul
L. B. Ritter - Area Leader
W. B. Roberts - Clerk-Stenographer

AREA II
WISCONSIN
Madison
T. F. Kouba - Area Leader
H. F. Williams - Field Supervisor (A)
I. M. Goul - Clerk-Steno.

AREA III
MICHIGAN
Lansing
L. E. Nelson - Area Leader
Agnes Phelps - Clerk Steno.

Walker, Minn.
J. W. Licka - Dist. Leader

Duluth, Minn.
R. W. Nelson - Dist. Leader

Cable, Wis.
A. W. Depta - Dist. Leader

Antigo, Wis.
Ray Weber - Dist. Leader
G. O. Hill - Field Supvr. (A)

Escanaba, Mich.
S. M. Sager - Dist. Leader

Traverse City, Mich.
A. J. Verville - Field Supvr.
Wm. H. Mayon - Control

IONA
Celina
R. A. Boyce - Control Supervisor

ILLINOIS
Belvidere
E. D. Bergesen - Control Supervisor (A)

INDIANA
Indianapolis
R. C. Doerner - Control Supervisor

OHIO
Columbus
R. C. Doerner - Control Supervisor

(A) - employed on State funds
- employed on State funds
- employed on State funds

NORTH CENTRAL REGION

Estimated Commercial Value of White Pine in Control Area - \$406,000,000

Local Control - 1956

| Operating Agency | Acres Worked | | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|--------------|--------|-------------|--------|-----------------|---------------|----------|------|
| | Initial | Rework | Maint. Work | Total | | | Ribes | Per |
| State-Coop. | 42,208 | 23,966 | 1,063 | 67,237 | 1,090,941 | 7,321 | 16.2 | 0.71 |
| Nat. Forests | 10,807 | 12,042 | 1,313 | 24,162 | 547,243 | 4,076 | 22.6 | 0.87 |
| Ind. Service | 150 | 5,015 | 2,171 | 7,336 | 193,035 | 2,397 | 26.3 | 0.30 |
| Total | 53,165 | 41,023 | 4,547 | 98,735 | 1,831,219 | 13,794 | 18.5 | 0.61 |

Status of Control (Net)

| Item | National Forests | Ind. Reserv. | Non-Fed. Public | Private | Total |
|---------------------------------|------------------|--------------|-----------------|-----------|-----------|
| | | | | | |
| W.P. in Control Area, Acres | 175,243 | 84,058 | 376,387 | 644,078 | 1,279,766 |
| Total Control Area, Acres | 353,324 | 142,020 | 945,303 | 2,299,894 | 3,740,541 |
| Percent Worked Initially | 93.5 | 96.7 | 89.7 | 83.0 | 86.7 |
| Percent On Maintenance | 68.4 | 78.6 | 45.3 | 40.2 | 65.6 |
| Needing Initial Work, Acres | 22,883 | 4,640 | 96,980 | 390,865 | 515,368 |
| Needing Rework, Acres | 88,849 | 25,494 | 419,884 | 983,539 | 1,517,766 |
| Needing Maintenance Work, Acres | 241,592 | 110,886 | 428,439 | 925,490 | 1,706,407 |

Blister Rust Infection, 1956: Pine infection found for first time in Hancock County, Illinois, in Franklin County, Iowa, and in Mower and Dodge Counties in Minnesota. Cumulative: On pines and ribes in all seven states. Most severe in north. Found on pines in 208 counties; on ribes in 398 counties of the 621 counties in the seven states in the region.

Nursery Sanitation, 1956: 3 state nurseries worked, all in Wisconsin. Ribes-free zones maintained around 42 nurseries producing about 30 million white pine trees annually.

Canker Pruning, 1956: 8,738 cankers removed to save 6,593 infected trees; 1,066 fatally infected trees removed. Canker pruning done in Iowa, Michigan, Minnesota, Wisconsin.

Surveying, 1956: 55,018 acres control area initially surveyed; 57,699 acres post-checked, and 55,937 acres retained. White pine in regional control area increased by 16,703 acres over 1955.

Checking After Eradication, 1956: 93,544 acres worked and checked, and all but 116 acres found satisfactory.

Summary of White Pine Blister Rust Control - December 31, 1956

ILLINOIS

Estimated Commercial Value of White Pine in Control Area - \$2,000,000

Local Control, 1956

| Operating Agency | Acres Worked | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|--------------|--------|-------|-----------------|---------------|----------|----------|
| | Initial | Rework | Total | | | Ribes | Man-Days |
| State-Coop. | 255 | 1,086 | 1,341 | 100,839 | 234 | 75.2 | 0.17 |

Status of Control (Net)

| Item | Non-Federal | | |
|---------------------------------|-------------|---------|--------|
| | Public | Private | Total |
| W.P. in Control Area, Acres | 1,672 | 922 | 2,594 |
| Total Control Area, Acres | 7,761 | 5,306 | 13,067 |
| Percent Worked Initially | 98.7 | 91.9 | 96.0 |
| Percent on Maintenance | 31.9 | 17.4 | 26.0 |
| Needing Initial Work, Acres | 98 | 428 | 526 |
| Needing Rework, Acres | 5,187 | 3,956 | 9,143 |
| Needing Maintenance Work, Acres | 2,476 | 922 | 3,398 |

Blister Rust Infection, 1956: On pine for first time in Hancock County, also reported for first time in 1954, McDonough and Mason Counties; Cumulative: On pines in 15 counties; on Ribes in 30 of the 102 counties in the State.

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 2 nurseries.

Surveying, 1956: 56 acres control area initially surveyed; 1,789 acres post-checked, 1,471 acres retained.

Checking After Eradication, 1956: 987 acres checked for ribes after eradication and all found satisfactory.

Summary of White Pine Blister Rust Control - December 31, 1956

INDIANA

Estimated Commercial Value of White Pine in Control Area - \$7,000,000

Local Control, 1956 - None Performed

Status of Control (Net)

| Item | National
Forests | Non-Federal
Public | Private | Total |
|---------------------------------|---------------------|-----------------------|---------|--------|
| W.P. in Control Area, Acres | 18 | 3,169 | 7,560 | 10,747 |
| Total Control Area, Acres | 179 | 18,209 | 74,196 | 92,584 |
| Percent Worked Initially | 100.0 | 95.1 | 83.5 | 85.9 |
| Percent on Maintenance | 100.0 | 86.3 | 68.8 | 72.3 |
| Needing Initial Work, Acres | - | 887 | 12,213 | 13,100 |
| Needing Rework, Acres | - | 1,599 | 10,970 | 12,569 |
| Needing Maintenance Work, Acres | 179 | 15,723 | 51,013 | 66,915 |

Blister Rust Infection, 1956: No new counties. Cumulative: On white pine in 3 northern counties; on ribes in 53 of the 92 counties in the State

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 3 nurseries.

Summary of White Pine Blister Rust Control - December 31, 1956

IOWA

Estimated Commercial Value of White Pine in Control Area - \$5,000,000

| Operating Agency | Local Control, 1956 | | Total | Ribes | | Man-Days | |
|------------------|---------------------|--------|-------|-----------|------|----------|----------|
| | Initial | Rework | | Destroyed | Used | Ribes | Man-Days |
| State-Coop. | 144 | 273 | 417 | 21,381 | 171 | 51.3 | 0.47 |

Status of Control (Net)

| Item | Indian Reserv. | Non-Federal Public | Private | Total |
|---------------------------------|----------------|--------------------|---------|--------|
| W.P. in Control Area, Acres | 50 | 627 | 2,485 | 3,162 |
| Total Control Area, Acres | 500 | 3,818 | 10,551 | 14,869 |
| Percent Worked Initially | 100.0 | 99.5 | 63.2 | 73.7 |
| Percent on Maintenance | 41.2 | 5.2 | 19.5 | 16.5 |
| Needing Initial Work, Acres | 0 | 20 | 3,887 | 3,907 |
| Needing Rework, Acres | 294 | 3,599 | 4,609 | 8,502 |
| Needing Maintenance Work, Acres | 206 | 199 | 2,055 | 2,460 |

Blister Rust Infection, 1956: On pine in Franklin County. Cumulative: On white pine in 12 counties in northeastern Iowa; on ribes in 56 of 99 counties in the State.

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 7 nurseries.

Canker Pruning, 1956: 212 cankers removed to save 148 trees; 295 fatally infected trees removed.

Surveying, 1956: 144 acres initially surveyed; 325 acres control area post-checked, and all retained.

Summary of White Pine Blister Rust Control - December 31, 1956

MICHIGAN

Estimated Commercial Value of White Pine in Control Area - \$164,000,000

Local Control, 1956

| Operating Agency | Acres Worked | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|--------------|--------|-------------|-----------------|---------------|----------|----------|
| | Initial | Rework | Maint. Work | | | Ribes | Man Days |
| State-Coop. | 9,245 | 6,355 | 185 | 15,785 | 304,122 | 2,322 | 19.3 |
| Nat. Forests | 4,695 | 8,855 | 1,313 | 14,863 | 166,883 | 965 | 11.2 |
| Total | 13,940 | 15,210 | 1,498 | 30,648 | 471,005 | 3,287 | 15.4 |

Status of Control (Net)

| Item | National | Non-Federal | | |
|---------------------------------|----------|-------------|---------|-----------|
| | Forests | Public | Private | Total |
| W.P. in Control Area, Acres | 80,463 | 148,425 | 226,614 | 455,502 |
| Total Control Area, Acres | 197,583 | 329,994 | 738,489 | 1,266,066 |
| Percent Worked Initially | 96.9 | 93.4 | 86.2 | 89.8 |
| Percent on Maintenance | 76.7 | 52.8 | 35.0 | 46.2 |
| Needing Initial Work, Acres | 6,140 | 21,684 | 101,807 | 129,631 |
| Needing Rework, Acres | 39,748 | 133,915 | 378,171 | 551,834 |
| Needing Maintenance Work, Acres | 151,695 | 174,395 | 258,511 | 584,601 |

Blister Rust Infection, 1956: No new counties. Cumulative: On pines in 55 counties; on ribes in all 83 counties in the State.

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 9 nurseries.

Canker Pruning, 1956: 5,372 cankers removed to save 2,182 trees; 500 fatal infected trees removed.

Surveying, 1956: 11,010 acres control area initially surveyed; 16,241 acres post-checked, and 15,160 acres retained. Total control area increased by 8,101 acres.

Checking After Eradication, 1956: 30,478 acres checked for ribes after eradication, and all found satisfactory.

Summary of White Pine Blister Rust Control - December 31, 1956

MINNESOTA

Estimated Commercial Value of White Pine in Control Area - \$41,000,000

| Operating Agency | Local Control, 1956 | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|---------------------|--------|-------|-----------------|---------------|----------|-------|
| | Initial | Rework | Total | | | Ribes | Total |
| State-Coop. | 929 | 2,011 | 2,940 | 233,943 | 1,593 | 79.6 | 0.54 |
| Nat. Forests | 1,868 | 221 | 2,089 | 257,191 | 1,567 | 123.1 | 0.75 |
| Ind. Service | - | 2,740 | 2,740 | 139,113 | 1,059 | 50.8 | 0.39 |
| Total | 2,797 | 4,972 | 7,769 | 630,247 | 4,219 | 81.1 | 0.56 |

| Item | Status of Control (Net) | | | | | Total |
|---------------------------------|-------------------------|----------------|-----------------|---------|--|---------|
| | National Forests | Indian Reserv. | Non-Fed. Public | Private | | |
| W.P. in Control Area, Acres | 47,121 | 20,791 | 58,797 | 105,758 | | 232,467 |
| Total Control Area, Acres | 70,828 | 30,899 | 121,121 | 307,436 | | 530,284 |
| Percent Worked Initially | 83.9 | 97.2 | 59.1 | 70.5 | | 74.7 |
| Percent on Maintenance | 44.2 | 74.3 | 17.0 | 15.4 | | 23.6 |
| Needing Initial Work, Acres | 11,372 | 851 | 49,573 | 90,712 | | 152,508 |
| Needing Rework, Acres | 28,146 | 7,082 | 50,918 | 169,527 | | 255,673 |
| Needing Maintenance Work, Acres | 31,310 | 22,966 | 20,630 | 47,197 | | 122,103 |

Blister Rust Infection, 1956: On pines for first time in Mower and Dodge Counties. Cumulative: On pines in 41 counties; on ribes in 40 of the 87 counties in the State. Rust prevalent in all pine-growing counties, especially severe in northeastern Minnesota.

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 2 nurseries.

Canker Pruning, 1956: 346 cankers removed to save 252 trees; 46 fatally infected trees removed.

Surveying, 1956: 2,030 acres control area initially surveyed; 11,751 acres post-checked, and increased to 11,884 acres.

Checking After Eradication, 1956: 6,672 acres checked for ribes after eradication, and all but 116 acres found satisfactory.

Summary of White Pine Blister Rust Control - December 31, 1956

OHIO

Estimated Commercial Value of White Pine in Control Area - \$14,000,000

Local Control, 1956

| Operating Agency | Acres Worked | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|--------------|--------|-------|-----------------|---------------|----------|----------|
| | Initial | Rework | Total | | | Ribes | Man-Days |
| State-Coop. | 745 | 3,967 | 4,712 | 655 | 11 | 0.1 | Tr. |

Status of Control (Net)

| Item | National Forests | Non-Federal Public | Private | Total |
|---------------------------------|------------------|--------------------|---------|---------|
| | | | | |
| W.P. in Control Area, Acres | 515 | 8,787 | 13,414 | 22,716 |
| Total Control Area, Acres | 4,029 | 33,693 | 97,974 | 135,696 |
| Percent Worked Initially | 100.0 | 87.7 | 94.7 | 93.1 |
| Percent on Maintenance | 100.0 | 63.6 | 84.6 | 79.9 |
| Needing Initial Work, Acres | 0 | 4,131 | 5,201 | 9,332 |
| Needing Rework, Acres | 0 | 8,125 | 9,882 | 18,007 |
| Needing Maintenance Work, Acres | 4,029 | 21,437 | 82,891 | 108,357 |

Blister Rust Infection, 1956: No new counties. Cumulative: On pines in 11 counties; on ribes in 65 of the 88 counties in the State.

Nursery Sanitation, 1956: None. Cumulative: Ribes-free zones maintained around 7 nurseries.

Surveying, 1956: 2,603 acres control area initially surveyed; 10,590 acres post-checked, and 4,792 acres retained.

Checking After Eradication, 1956: 2,832 acres checked for ribes after eradication, and all found satisfactory.

WISCONSIN

Estimated Commercial Value of White Pines in Control Area - \$173,000.000

Local Control, 1956

| Operating Agency | Acres Worked | | | | Ribes Destroyed | Man-Days Used | Per Acre | |
|------------------|--------------|--------|-------------|--------|-----------------|---------------|----------|----------|
| | Initial | Rework | Maint. Work | Total | | | Ribes | Man-Days |
| State-Coop. | 30,890 | 10,274 | 878 | 42,042 | 430,001 | 2,990 | 10.2 | 0.07 |
| Nat. Forests | 4,244 | 2,966 | - | 7,210 | 123,169 | 1,544 | 17.1 | 0.22 |
| Ind. Service | 150 | 2,275 | 2,171 | 4,596 | 53,922 | 1,338 | 11.7 | 0.29 |
| Total | 35,284 | 15,515 | 3,049 | 53,848 | 607,092 | 5,872 | 11.3 | 0.58 |

Status of Control (Net)

| Item | National Forests | Ind. Reserv. | Non-Fed. Public | Private | Total |
|---------------------------------|------------------|--------------|-----------------|-----------|-----------|
| | | | | | |
| W.P. in Control Area, Acres | 47,126 | 63,217 | 154,910 | 287,325 | 552,578 |
| Total Control Area, Acres | 80,705 | 109,621 | 430,707 | 1,065,942 | 1,686,975 |
| Percent Worked Initially | 93.3 | 96.5 | 95.2 | 83.4 | 87.6 |
| Percent On Maintenance | 67.4 | 80.0 | 44.9 | 45.3 | 48.5 |
| Needing Initial Work, Acres | 5,371 | 3,789 | 20,587 | 176,617 | 206,364 |
| Needing Rework, Acres | 20,955 | 18,118 | 246,541 | 406,424 | 692,038 |
| Needing Maintenance Work, Acres | 54,379 | 87,714 | 193,579 | 482,901 | 818,573 |

Blister Rust Infection, 1956: Cumulative: On pines and ribes in all 71 counties in the State.

Nursery Sanitation, 1956: Boscobel, Gordon, Hayward State Nurseries worked, using 115 man-days. Ribes-free conditions being maintained around 12 nurseries.

Canker Pruning, 1956: 2,808 cankers removed to save 2,000 trees; 225 fatally infected trees removed.

Surveying, 1956: 39,175 acres control area initially surveyed; 17,003 acres post-checked, and increased to 22,305 acres. Total control area in State increased by 52,551 acres.

Checking After Eradication, 1956: 52,459 acres checked for ribes after eradication, and all found satisfactory.

Blister Rust Control on National Forests

North Central Region, 1956

Objective

The objective is to establish and maintain protection against blister rust around all valuable white pine stands and nurseries on national forest lands.

Organization of Work

The organization remained the same in 1956 as in previous years. National forests were responsible for selection of pine stands to be protected, and for furnishing labor and crew leaders. The F.P.C. Section, through District Leaders, directly trained and supervised control work on all forests except the Superior, where the Forest operated a camp. Responsibility for preparing work plans and maps, training men, checking on adequacy of work, maintaining records and writing reports, remained with the Forest Pest Control Section. Close cooperation between the national forests and this Section was continued throughout the Region.

Current Work, 1956

Surveys

Pre-eradication survey and post-check were performed on all forests in the three Lake States. The application of these data to the control problem is shown in Text Table 3.

Local Control

Ribes eradication in 1956 was done on all seven forests in the three Lake States (Text Table 1). For the first time a small amount of work was done on pines in a maintenance status in Michigan.

Most of the work was done by local men working by the hour. A camp of 30 men was operated on the Gunflint District of the Superior National Forest during the summer, using several forestry students from the University of Minnesota. Unfortunately, they had to go to forestry camp about August 1, necessitating the training of a substantial number

of green men in mid-season. Practically all of the control work on the Lower Michigan National Forest was done through ribes eradication contracts, and these were successfully completed.

Checking on completed work on 23,853 acres showed that satisfactory elimination of ribes was accomplished on all but 116 acres.

Canker Pruning

To save infected pines in protected stands, cankers were removed from 700 trees on the Ottawa National Forest, and from 1,006 trees on the Chequamegon National Forest.

Costs

Costs of blister rust control, exclusive of help from the F.P.C. Section, by national forests are shown in Text Table 2. Costs per man-day varied from a low of \$11.29 on the Nicolet to \$22.87 on the Superior. These per man-day costs were derived by dividing the total cost to the forest by the number of man-days reported. Thus they include, besides wages, costs of travel, per diem, and in some cases, common services. The cost is high on the Superior because of camp operation, and increased travel necessary to reach distant areas.

The cost per acre is quite narrowly proportional to the number of ribes per acre destroyed. Since the abundance of ribes is the chief controlling factor of costs, uniformity in its relationship to costs is indicative of good organization - close formation of crews where ribes are heavy, wide spacing where ribes are not abundant.

Status of Control

In Text Table 3 the status of control on national forests at the end of 1956 is shown. There was no substantial change in the total problem over 1955.

Approximately 6,000 additional acres of control area were placed on maintenance. At present, of the 353,300 acres in the total control problem, 93.5% has been initially worked, and 68.4% placed on maintenance.

The biggest job remaining continues to be on the Superior, where inaccessibility, camp operation, high wage rates, many ribes and favorable rust conditions combine to make ribes eradication costly and difficult. The Chequamegon is second in having the largest work load remaining. Although there is a substantial acreage of new white pine on the Huron to be initially worked, ribes are relatively not abundant, and acreage can be worked quite cheaply. The major job on the other forests is necessary rework and maintenance of ribes suppressed conditions on areas where control has been established.

A chart was included in the 1955 report showing graphically the status of control on each forest. This chart is not included here, because changes in status were not sufficiently large to show a difference in the scale used. The reader is referred to the 1955 report.

Separate detailed reports for each national forest have been prepared by the District Leaders and forwarded to the Supervisor concerned with sufficient copies for the rangers. Details of the work on each forest will therefore not be repeated here.

Work Plans

A five-year work plan for each forest has been prepared jointly by our District Leader and the forest concerned. Detailed work plans for the remainder of fiscal year 1957 and for 1958 are not included with this report, because all of the data are not at hand. Such work plans will be forwarded later.

Table 1. Local Control on National Forests

North Central Region, Calendar Year 1956

| National Forest | Number
of Areas
Worked | Acres of
White Pine
Protected | Acres of
Control
Area Worked | Ribes
Bushes
Destroyed | Man-De
Used |
|-------------------|------------------------------|-------------------------------------|------------------------------------|------------------------------|----------------|
| Initial Work | | | | | |
| Huron, Mich. | 8 | 598 | 1,255 | 15,322 | 81 |
| Manistee, Mich. | 16 | 1,735 | 3,440 | 22,223 | 98 |
| Superior, Minn. | 17 | 1,240 | 1,868 | 217,785 | 1,374 |
| Chequamegon, Wis. | 10 | 2,612 | 3,944 | 93,149 | 738 |
| Nicolet, Wis. | 1 | 170 | 300 | 1,437 | 25 |
| Total, Initial | 52 | 6,355 | 10,807 | 349,916 | 2,316 |

| | | | | | |
|-------------------|----|-------|--------|---------|-------|
| Rework | | | | | |
| Hiawatha, Mich. | 13 | 3,020 | 6,385 | 39,843 | 294 |
| Ottawa, Mich. | 11 | 1,415 | 2,470 | 85,490 | 144 |
| Superior, Minn. | 1 | 52 | 113 | 15,569 | 98 |
| Chippewa, Minn. | 3 | 67 | 108 | 23,837 | 95 |
| Chequamegon, Wis. | 3 | 845 | 1,196 | 6,345 | 108 |
| Nicolet, Wis. | 2 | 1,235 | 1,770 | 22,238 | 633 |
| Total, Rework | 33 | 6,634 | 12,042 | 193,322 | 1,772 |

Maintenance Work

| | | | | | |
|--------------------|---|-----|-------|-------|-----|
| Manistee, Mich. | 1 | 54 | 219 | 311 | 6 |
| Hiawatha, Mich. | 2 | 290 | 770 | 2,468 | 80 |
| Ottawa, Mich. | 2 | 200 | 324 | 1,226 | 82 |
| Total, Maintenance | 5 | 544 | 1,313 | 4,005 | 148 |

All Work

| | | | | | |
|-------------------|----|--------|--------|---------|-------|
| Huron, Mich. | 8 | 598 | 1,255 | 15,322 | 81 |
| Manistee, Mich. | 17 | 1,789 | 3,659 | 22,534 | 104 |
| Hiawatha, Mich. | 15 | 3,310 | 7,155 | 42,311 | 372 |
| Ottawa, Mich. | 13 | 1,615 | 2,794 | 86,716 | 166 |
| Superior, Minn. | 18 | 1,292 | 1,981 | 233,354 | 1,472 |
| Chippewa, Minn. | 3 | 67 | 108 | 23,837 | 95 |
| Chequamegon, Wis. | 13 | 3,457 | 5,140 | 99,494 | 846 |
| Nicolet, Wis. | 3 | 1,405 | 2,070 | 23,675 | 653 |
| Total, All Work | 90 | 13,533 | 24,162 | 547,243 | 4,076 |

Text Table 2. Costs of Ribes Eradication on National Forests, Calendar Year 1956

| Item | Huron* | Manistee* | Hiawatha | Ottawa | Superior | Chippewa | Chequamegon | Nicolet | Total |
|------------------------|---------|-----------|----------|---------|----------|----------|-------------|---------|----------|
| Total Costs, C.Y. 1956 | \$2,094 | \$2,207 | \$4,389 | \$6,393 | \$33,670 | \$1,313 | \$11,357 | \$7,430 | \$67,825 |
| Total Man-Days | 81 | 104 | 514 | 466 | 1,472 | 95 | 886 | 658 | 4,072 |
| Cost per Man-Day | \$25.51 | \$21.22 | \$13.98 | \$13.72 | \$22.87 | \$13.82 | \$12.82 | \$11.29 | \$16.88 |
| Acres Worked | 15.5 | 35.2 | 22.8 | 5.0 | 1.3 | 1.1 | 5.8 | 1.1 | 68.8 |
| per Man-Day | | | | | | | | | |
| Ribes per Acre | 12.2 | 6.1 | 5.9 | 31.0 | 117.0 | 220.7 | 19.4 | 11.4 | 23.4 |
| Costs per Acre | \$0.61 | \$0.60 | \$0.61 | \$2.28 | \$17.00 | \$12.16 | \$2.21 | \$3.59 | \$5.0 |

* Work chiefly done under contract

Text Table 3. Status of Control on National Forests, R-9, on December 31, 1956

| National Forest | Total Acres | | | Acres Initially | | Percent Control Area | | Acres Control Area Required | | |
|-------------------|-------------|--------------|------------|-----------------|--------------|----------------------|-----------------|-----------------------------|--------|------------------|
| | White Pine | Control Area | White Pine | Worked | Control Area | Initially Worked | On Main-tenance | Initial | | Maintenance Work |
| | | | | | | | | Work | Rework | |
| Hessier, Ind. | 18 | 179 | 18 | 179 | 179 | 100.0 | 100.0 | 0 | 0 | 10.4 |
| Wayne, Ohio | 515 | 4,029 | 515 | 4,029 | 4,029 | 100.0 | 100.0 | 0 | 0 | 4,029 |
| Huron, Mich. | 10,982 | 22,944 | 8,467 | 18,664 | 18,664 | 78.7 | 33.9 | 4,880 | 10,285 | 7,783 |
| Manistee, Mich. | 31,280 | 88,093 | 31,090 | 87,593 | 87,593 | 99.4 | 88.5 | 500 | 9,653 | 11,153 |
| Hiawatha, Mich. | 15,224 | 39,584 | 14,964 | 38,624 | 38,624 | 98.1 | 83.7 | 760 | 5,678 | 11,116 |
| Marquette, Mich. | 11,702 | 25,720 | 11,702 | 25,720 | 25,720 | 100.0 | 81.4 | 0 | 4,778 | 10,136 |
| Ottawa, Mich. | 11,275 | 21,242 | 11,275 | 21,242 | 21,242 | 100.0 | 56.0 | 0 | 9,354 | 12,889 |
| Superior, Minn. | 34,075 | 48,757 | 27,457 | 37,707 | 37,707 | 77.3 | 32.4 | 11,050 | 21,901 | 15,806 |
| Chippewa, Minn. | 13,046 | 22,071 | 12,944 | 21,749 | 21,749 | 98.5 | 70.3 | 322 | 6,215 | 16,500 |
| Chequamegon, Wis. | 13,943 | 55,059 | 31,101 | 49,688 | 49,688 | 90.2 | 66.0 | 5,371 | 13,711 | 18,082 |
| Nicolet, Wis. | 12,163 | 25,616 | 13,193 | 25,646 | 25,646 | 100.0 | 10.2 | 0 | 7,602 | 9,766 |
| Total | 175,243 | 353,234 | 167,706 | 330,443 | 330,443 | 97.5 | 68.4 | 20,889 | 68,239 | 100,000 |

Blister Rust Control on Indian Reservations

North Central Region, 1956

Objective

The objective is to establish and maintain protection against blister rust around valuable white pine stands on Indian Reservations.

Organization of Work

As in the past, the Indian Service is responsible for the selection of areas to be protected, and the employment of Indian labor and crew loaders. The Forest Service, through the Forest Pest Control Section, has the responsibility of preparing work plans and maps, training of men, checking on adequacy of work, keeping records, and making periodic reports.

Current Work, 1956

Surveys

As a result of pre-eradication surveys and post-checks, there was a small increase of 400 acres of natural pine added to the control problem on the Menominee Indian Reservation.

Local Control

Ribes eradication was done on 36 areas on four Reservations (Text Table 4), using Indian labor. Except for a small acreage of initial work on the Lac Court Oreilles, most of the ribes eradication was as rework on the Nett Lake, Red Lake and Menominee Reservations. A considerable acreage on Maintenance on the Lac Court Oreilles Reservation was checked for ribes.

On the Menominee Reservation 2,4,5-T at the rate of 1 ounce per 1 gallon of water was applied by a power sprayer to kill ribes for the first time in this Region. The spray equipment consisted of a 120 gallon tank and pump on a two-wheel trailer pulled by a jeep, several hundred feet of main and lateral hoses, and 4 Kromer handguns. A crew of three or four men operated this spray equipment cleaning out fingers of swamp surrounded by pine stands. Preliminary inspection showed a good job was done, but final checking will be delayed until spring.

All of the ribes eradication on the Reservations worked and checked was found to be satisfactory.

Costs

Costs of control in 1956 are shown in Text Table 5. Cost per man-day varied narrowly around the average of \$12.50. Costs per acre worked varied directly with the number of ribes pulled per acre.

Status of Control

It is evident from Text Table 6 that blister rust control is in a very satisfactory condition on Indian lands, with 96.7% of the 141,020 acres of control area initially worked, and 78.6% on maintenance. Except for small acreages remaining to be initially worked on the Menominee, Lac Court Oreilles and Red Lake Reservations, most of the work remaining is rework to put all areas in the maintenance column. While all of the acreage of white pine on the Grand Portage Reservation has been initially worked, this is the only Reservation where none of it is on maintenance.

Individual reports for each Reservation have been prepared and furnished the Reservations concerned. Therefore, details for each Reservation are omitted here. A chart in the 1955 Regional report shows the control status of each Reservation. Since the status at the end of 1956 remains nearly the same, the chart is omitted here. The reader is referred to the 1955 report.

Work Plans

Long-time work plans have been jointly prepared for each Reservation. Detailed plans for work in the rest of fiscal year 1957, and for fiscal year 1958 are shown in each Reservation report.

Text Table 4. Local Control on Indian Reservations,
North Central Region, Calendar Year 1956

| Indian Reservation | Number
of Areas
Worked | Acres of
White Pine
Protected | Acres of
Control
Area Worked | Ribes
Bushes
Destroyed | Man-Days
Used |
|--------------------------|------------------------------|-------------------------------------|------------------------------------|------------------------------|------------------|
| Initial Work | | | | | |
| Lac Court Oreilles, Wis. | 1 | 90 | 150 | 1,614 | 49 |
| Rework | | | | | |
| Nett Lake, Minn. | 2 | 60 | 88 | 35,342 | 203 |
| Red Lake, Minn. | 25 | 777 | 2,652 | 103,771 | 856 |
| Menominee, Wis. | 4 | 1,425 | 2,275 | 30,140 | 609 |
| Total, Rework | 31 | 2,262 | 5,015 | 169,253 | 1,668 |
| Maintenance Work | | | | | |
| Lac Court Oreilles, Wis. | 4 | 1,264 | 2,171 | 22,168 | 680 |
| All Work | | | | | |
| Nett Lake, Minn. | 2 | 60 | 88 | 35,342 | 203 |
| Red Lake, Minn. | 25 | 777 | 2,652 | 103,771 | 856 |
| Lac Court Oreilles, Wis. | 5 | 1,354 | 2,321 | 23,782 | 729 |
| Menominee, Wis. | 4 | 1,425 | 2,275 | 30,140 | 609 |
| Total, All Work | 36 | 3,616 | 7,336 | 193,035 | 2,397 |

Text Table 5. Costs of Ribes Eradication on Indian Reservations, C. Y. 1956

| Item | Nett Lake | Red Lake | Lac Court
Oreilles | Menominee | Total |
|--------------------------|-----------|----------|-----------------------|-----------|----------|
| Total cost, C.Y. 1956 | \$ 2,686 | \$10,109 | \$ 9,185 | \$ 8,089* | \$30,069 |
| Man-Days Used | 203 | 856 | 729 | 609 | 2,397 |
| Cost per Man-day | \$ 13.23 | \$ 11.81 | \$ 12.60 | \$ 13.28 | \$ 12.51 |
| Acres Worked per Man-day | 0.4 | 3.1 | 3.2 | 3.7 | 3.2 |
| Ribes per Acre | 401.6 | 39.1 | 10.2 | 13.2 | 26.3 |
| Costs per Acre | \$ 30.52 | \$ 3.81 | \$ 3.96 | \$ 3.56 | \$ 4.10 |

* Includes \$4308 of Menominee Tribal Funds

Text Table 6. Status of Control on Indian Reservations, North Central Region, on December 31, 1956

| Indian Reservation | Total Acres | | Acres Initially Worked | | Percent Control Initially Worked | | Control Area | | On Main-tenance | | Acres Control Area Requiring | |
|--------------------------|-------------|--------------|------------------------|--------------|----------------------------------|------------------|--------------|-----------------|-----------------|--------|------------------------------|--|
| | White Pine | Control Area | White Pine | Control Area | Initially Worked | Initially Worked | Control Area | On Main-tenance | Initial Work | Rework | Main-tenance | |
| | | | | | | | | | | | | |
| Sac-Fox, Iowa | 50 | 500 | 50 | 500 | 100.0 | 100.0 | 500 | 41.2 | 0 | 294 | 0 | |
| Grand Portage, Minn. | 1,097 | 1,496 | 1,097 | 1,496 | 100.0 | 100.0 | 1,496 | 0.0 | 0 | 1,496 | 0 | |
| Leech Lake, Minn. | 1,094 | 1,639 | 1,080 | 1,596 | 97.4 | 97.4 | 1,596 | 65.5 | 43 | 523 | 0 | |
| Nett Lake, Minn. | 5,212 | 7,079 | 5,212 | 7,079 | 100.0 | 100.0 | 7,079 | 88.1 | 0 | 841 | 0 | |
| Vermilion, Minn. | 78 | 186 | 78 | 186 | 100.0 | 100.0 | 186 | 100.0 | 0 | 0 | 0 | |
| White Earth, Minn. | 502 | 1,056 | 502 | 1,056 | 100.0 | 100.0 | 1,056 | 51.6 | 0 | 511 | 0 | |
| Red Lake, Minn. | 12,808 | 19,443 | 12,293 | 18,635 | 95.8 | 95.8 | 18,635 | 76.8 | 808 | 3,711 | 0 | |
| Bad River, Wis. | 8,547 | 15,023 | 8,451 | 14,846 | 98.8 | 98.8 | 14,846 | 90.0 | 177 | 1,327 | 0 | |
| Lac Court Oreilles, Wis. | 15,174 | 26,685 | 14,115 | 25,358 | 95.0 | 95.0 | 25,358 | 85.2 | 1,327 | 2,634 | 0 | |
| Lac du Flambeau, Wis. | 14,411 | 26,001 | 14,411 | 26,001 | 100.0 | 100.0 | 26,001 | 100.0 | 0 | 0 | 0 | |
| Menominee, Wis. | 25,085 | 41,912 | 23,902 | 39,627 | 94.5 | 94.5 | 39,627 | 60.8 | 2,285 | 14,157 | 0 | |
| Total, Ind. Reserv. | 84,058 | 141,020 | 81,191 | 136,380 | 96.7 | 96.7 | 136,380 | 78.6 | 4,640 | 25,494 | 0 | |

Table 1. Surveys Performed in North Central Region
Calendar Year 1956

| State | Type of Survey | No. of
Areas
Mapped | Acres Mapped
Previously | | Total Acres
Mapped, Net | | Total
Acres
Treated |
|-----------|-----------------|---------------------------|----------------------------|-----------------|----------------------------|-----------------|---------------------------|
| | | | White
Pine | Control
Area | White
Pine | Control
Area | |
| Illinois | Pre-eradication | 1 | - | - | 4 | 56 | |
| | Post-Check | 4 | 396 | 1,789 | 415 | 1,471 | 35 |
| | Total | 5 | 396 | 1,789 | 419 | 1,527 | 100 |
| Iowa | Pre-eradication | 2 | - | - | 18 | 144 | |
| | Post-Check | 6 | 57 | 325 | 57 | 325 | 5 |
| | Total | 8 | 57 | 325 | 75 | 469 | 7 |
| Michigan | Pre-eradication | 56 | 682 | 1,828 | 5,072 | 11,010 | 60 |
| | Post-Check | 62 | 5,880 | 16,241 | 7,282 | 15,160 | 57 |
| | Total | 118 | 6,562 | 18,069 | 12,354 | 26,170 | 117 |
| Minnesota | Pre-eradication | 18 | - | - | 877 | 2,030 | |
| | Post-Check | 68 | 6,488 | 11,751 | 6,590 | 11,884 | 100 |
| | Total | 86 | 6,488 | 11,751 | 7,467 | 13,914 | 130 |
| Ohio | Pre-eradication | 16 | 22 | 342 | 1,342 | 2,603 | |
| | Post-Check | 53 | 1,805 | 10,590 | 2,101 | 4,792 | 47 |
| | Total | 69 | 1,827 | 10,932 | 3,443 | 7,395 | 47 |
| Wisconsin | Pre-eradication | 47 | - | - | 10,123 | 39,175 | 100 |
| | Post-Check | 40 | 7,306 | 17,003 | 9,419 | 22,305 | 133 |
| | Total | 87 | 7,306 | 17,003 | 19,542 | 61,480 | 273 |
| Region | Pre-eradication | 140 | 704 | 2,170 | 17,436 | 55,018 | 90 |
| | Post-Check | 233 | 21,932 | 57,699 | 25,864 | 55,937 | 305 |
| | Total | 373 | 22,636 | 59,869 | 43,300 | 110,955 | 405 |

Table 2. Summary of Local Control by States and Ownership Class
North Central Region, Calendar Year 1956

| State | Ownership Class | Number Areas Worked | Acres White Pine Protected | Acres Control Area Worked | Ribes Destroyed | Map |
|--------------|-----------------|---------------------|----------------------------|---------------------------|-----------------|-------|
| Initial Work | | | | | | |
| Illinois | Non-Fed. Public | 3 | 32 | 255 | 54,187 | 65 |
| Iowa | Non-Fed. Public | 2 | 18 | 144 | 8,014 | 64 |
| | Private | 23 | 2,309 | 5,540 | 126,458 | 533 |
| Michigan | Non-Fed. Public | 12 | 1,740 | 3,705 | 57,521 | 550 |
| | Nat. Forests | 24 | 2,333 | 4,695 | 37,516 | 177 |
| | Total | 59 | 6,382 | 13,940 | 221,527 | 1,263 |
| | Private | 7 | 100 | 370 | 85,106 | 100 |
| Minnesota | Non-Fed. Public | 3 | 330 | 559 | 62,126 | 391 |
| | Nat. Forests | 17 | 1,240 | 1,868 | 217,785 | 1,371 |
| | Total | 27 | 1,670 | 2,797 | 365,017 | 1,933 |
| | Private | 11 | 189 | 602 | 307 | 1 |
| Ohio | Non-Fed. Public | 3 | 68 | 143 | 0 | 0 |
| | Total | 14 | 257 | 745 | 307 | 1 |
| | Private | 32 | 6,989 | 26,840 | 167,115 | 100 |
| | Non-Fed. Public | 10 | 489 | 4,050 | 29,591 | 160 |
| Wisconsin | Nat. Forests | 11 | 2,782 | 4,244 | 94,586 | 767 |
| | Ind. Reserv. | 1 | 90 | 150 | 1,614 | 19 |
| | Total | 54 | 10,350 | 35,284 | 292,906 | 1,577 |
| | Private | 73 | 9,587 | 33,352 | 378,986 | 1,100 |
| | Non-Fed. Public | 23 | 2,677 | 8,856 | 211,442 | 1,207 |
| Region | Nat. Forests | 52 | 6,355 | 10,807 | 349,916 | 1,328 |
| | Ind. Reserv. | 1 | 90 | 150 | 1,614 | 19 |
| | Total, Initial | 159 | 18,709 | 53,165 | 941,958 | 4,914 |

Table 2. (Cont'd.) Summary of Control of Insects and Diseases in the North Central Forests, Calendar Year 1955

| State | Ownership Class | Number Areas Worked | Acres White Pine Protected | Acres Control | | Ribes Destroyed | Per Cent Control |
|------------------|--------------------|---------------------|----------------------------|---------------|---------|-----------------|------------------|
| | | | | Area Worked | | | |
| Rework | | | | | | | |
| Illinois | Non-Fed. Public | 10 | 326 | 1,086 | 46,652 | 168 | |
| Iowa | Non-Fed. Public | 3 | 57 | 273 | 13,367 | 107 | |
| | Private | 39 | 2,747 | 6,255 | 116,049 | 1,181 | |
| | Non-Fed. Public | 1 | 50 | 100 | 402 | 8 | |
| Michigan | Nat. Forests | 24 | 4,435 | 8,855 | 125,333 | 117 | |
| | Total | 64 | 7,232 | 15,210 | 242,781 | 1,929 | |
| | Private | 7 | 292 | 652 | 24,263 | 207 | |
| | Non-Fed. Public | 17 | 704 | 1,359 | 62,448 | 715 | |
| Minnesota | Nat. Forests | 4 | 119 | 221 | 39,406 | 33 | |
| | Ind. Reserv. | 27 | 837 | 2,740 | 139,113 | 152 | |
| | Total | 55 | 1,952 | 4,972 | 265,230 | 2,286 | |
| | Private | 33 | 1,011 | 2,697 | 216 | 2 | |
| Ohio | Non-Fed. Public | 9 | 654 | 1,270 | 132 | 1 | |
| | Total | 42 | 1,665 | 3,967 | 348 | 7 | |
| | Private | 7 | 3,794 | 7,913 | 151,314 | 1,293 | |
| | Non-Fed. Public | 9 | 771 | 2,361 | 80,850 | 800 | |
| Wisconsin | Nat. Forests | 5 | 2,080 | 2,966 | 28,583 | 18 | |
| | Ind. Reserv. | 4 | 1,425 | 2,275 | 30,140 | 609 | |
| | Total | 25 | 8,070 | 15,515 | 290,887 | 3,555 | |
| | Private | 86 | 7,844 | 17,517 | 291,842 | 2,311 | |
| | Non-Fed. Public | 49 | 2,562 | 6,449 | 203,851 | 1,844 | |
| Region | Nat. Forests | 33 | 6,634 | 12,042 | 193,322 | 8,741 | |
| | Ind. Reserv. | 31 | 2,262 | 5,015 | 169,253 | 2,688 | |
| | Total, Rework | 199 | 19,302 | 41,023 | 858,268 | 8,052 | |
| Maintenance Work | | | | | | | |
| | Private | 1 | 45 | 75 | 978 | 18 | |
| | Non-Fed. Public | 1 | 85 | 110 | 2,711 | 32 | |
| Michigan | Nat. Forests | 5 | 544 | 1,313 | 4,005 | 148 | |
| | Total | 7 | 674 | 1,498 | 7,694 | 90 | |
| | Private | 2 | 386 | 878 | 1,131 | 80 | |
| Wisconsin | Ind. Reserv. | 4 | 1,264 | 2,171 | 22,168 | 680 | |
| | Total | 6 | 1,650 | 3,049 | 23,299 | 710 | |
| | Private | 3 | 431 | 953 | 1,109 | 110 | |
| | Non-Fed. Public | 1 | 85 | 110 | 2,711 | 32 | |
| Region | Nat. Forests | 5 | 544 | 1,313 | 4,005 | 148 | |
| | Ind. Reserv. | 4 | 1,264 | 2,171 | 22,168 | 680 | |
| | Total, Maintenance | 13 | 2,324 | 4,547 | 30,993 | 830 | |

Table 2. (cont'd.) Summary of Local Control by States and Ownership Classes
North Central Region, Calendar Year 1956

| State | Ownership Class | Number Areas Worked | Acres White Pine Protected | Acres Control | | Ribes Destroyed | Non-Fed. Worked |
|-----------|-----------------|---------------------|----------------------------|---------------|--|-----------------|-----------------|
| | | | | Area Worked | | | |
| All Work | | | | | | | |
| Illinois | Non-Fed. Public | 13 | 358 | 1,341 | | 100,835 | 230 |
| Iowa | Non-Fed. Public | 6 | 75 | 417 | | 21,381 | 172 |
| | Private | 63 | 5,101 | 11,870 | | 243,485 | 770 |
| | Non-Fed. Public | 14 | 1,875 | 3,915 | | 60,637 | 500 |
| Michigan | Nat. Forests | 53 | 7,312 | 14,863 | | 166,883 | 300 |
| | Total | 130 | 14,288 | 30,648 | | 471,005 | 3,200 |
| | Private | 14 | 392 | 1,022 | | 109,369 | 400 |
| | Non-Fed. Public | 20 | 1,034 | 1,918 | | 124,574 | 1,000 |
| Minnesota | Nat. Forests | 21 | 1,359 | 2,089 | | 257,191 | 1,900 |
| | Ind. Reserv. | 27 | 837 | 2,740 | | 139,113 | 1,000 |
| | Total | 82 | 3,622 | 7,769 | | 630,247 | 4,200 |
| | Private | 44 | 1,200 | 3,299 | | 523 | |
| Ohio | Non-Fed. Public | 12 | 722 | 1,413 | | 132 | |
| | Total | 56 | 1,922 | 4,712 | | 655 | 11 |
| | Private | 41 | 11,169 | 35,631 | | 319,560 | 0 |
| | Non-Fed. Public | 19 | 1,260 | 6,411 | | 110,441 | 900 |
| Wisconsin | Nat. Forests | 16 | 4,862 | 7,210 | | 123,169 | 1,000 |
| | Ind. Reserv. | 9 | 2,779 | 4,596 | | 53,922 | 1,000 |
| | Total | 85 | 20,070 | 53,848 | | 607,092 | 5,000 |
| | Private | 162 | 17,862 | 51,822 | | 672,937 | 4,000 |
| | Non-Fed. Public | 83 | 5,324 | 15,415 | | 418,001 | 3,000 |
| Region | Nat. Forests | 90 | 13,533 | 24,162 | | 547,243 | 4,000 |
| | Ind. Reserv. | 36 | 3,616 | 7,336 | | 193,035 | 2,000 |
| | Total, All Work | 371 | 40,335 | 98,735 | | 1,831,219 | 13,190 |

Table 3. Results of Checking After Ribes Eradication by States and Ownership Classes
North Central Region, Calendar Year 1956

Table 4. Status of Control by States and Districts, North Central Region,

on December 31, 1956 - Net Acres

| District | Total Acres | | Acres Initially Worked | | Percent Control Area | | Acres Control Area Requiring | | | |
|-----------------|-------------|-----------|------------------------|------|----------------------|-----------------|------------------------------|---------|-----------|-----------|
| | White | Pine | White | Pine | Initially Worked | On Main-tenance | Initial Work | Rework | | |
| | | | | | | | | | Worked | tenance |
| AREA I | | | | | | | | | | |
| Iowa | | | | | | | | | | |
| Entire State | 3,152 | 14,869 | 1,891 | | 10,962 | 73.7 | 16.5 | 3,907 | 8,502 | 2,100 |
| Minnesota | | | | | | | | | | |
| Eastern | 106,495 | 250,865 | 67,273 | | 155,660 | 62.0 | 14.7 | 95,205 | 118,755 | 96,900 |
| Western | 125,972 | 279,419 | 103,195 | | 222,116 | 79.5 | 30.5 | 57,303 | 136,918 | 85,100 |
| Entire State | 232,467 | 530,284 | 170,468 | | 377,776 | 71.2 | 23.0 | 152,508 | 255,673 | 182,000 |
| Total, Area I | 235,629 | 545,153 | 172,359 | | 388,738 | 71.3 | 22.8 | 156,815 | 264,175 | 184,563 |
| AREA II | | | | | | | | | | |
| Illinois | | | | | | | | | | |
| Entire State | 2,594 | 13,067 | 2,527 | | 12,541 | 96.0 | 26.0 | 526 | 9,143 | 2,100 |
| Wisconsin | | | | | | | | | | |
| Eastern | 212,642 | 695,246 | 192,619 | | 613,867 | 88.3 | 45.5 | 81,379 | 297,398 | 116,100 |
| Western | 339,936 | 991,729 | 308,251 | | 866,744 | 87.4 | 50.6 | 124,985 | 364,640 | 505,100 |
| Entire State | 552,578 | 1,686,975 | 500,870 | | 1,480,611 | 87.8 | 48.5 | 206,364 | 662,038 | 516,100 |
| Total, Area II | 555,172 | 1,700,042 | 503,391 | | 1,493,152 | 87.8 | 48.4 | 206,890 | 671,181 | 821,911 |
| AREA III | | | | | | | | | | |
| Indiana | | | | | | | | | | |
| Entire State | 10,747 | 92,584 | 9,221 | | 79,484 | 85.9 | 73.3 | 13,100 | 22,569 | 50,000 |
| Ohio | | | | | | | | | | |
| Entire State | 22,716 | 135,696 | 19,468 | | 126,364 | 93.1 | 79.9 | 9,332 | 18,007 | 10,351 |
| Michigan | | | | | | | | | | |
| Lower Peninsula | 309,525 | 934,752 | 278,400 | | 836,913 | 89.5 | 42.4 | 97,839 | 443,190 | 197,000 |
| Upper Peninsula | 145,977 | 331,314 | 130,850 | | 299,522 | 90.4 | 57.8 | 31,792 | 108,000 | 180,100 |
| Entire State | 455,502 | 1,266,066 | 409,220 | | 1,136,435 | 89.9 | 46.2 | 129,631 | 551,190 | 377,100 |
| Total, Area III | 488,265 | 1,494,216 | 437,909 | | 1,342,283 | 89.8 | 50.0 | 152,062 | 502,190 | 179,011 |
| Regional Total | 1,279,755 | 3,739,511 | 1,113,665 | | 3,224,173 | 86.2 | 45.6 | 515,368 | 1,517,700 | 1,106,607 |

Table 5. Status of Control by Ownership Classes, North Central Region
on December 31, 1956 - Net Acres

| Forest or
State | Total Acres | | Acres Initially Worked | | Percent Control Area | | Acres Control Area Requisitioned | |
|----------------------------|---------------|-----------------|------------------------|-----------------|----------------------|---------------------|----------------------------------|----------------------|
| | White
Pine | Control
Area | White
Pine | Control
Area | Initially
Worked | On Main-
tenance | Initial
Work | Rework
and
Re- |
| | | | | | | | | |
| Illinois | 922 | 5,306 | 857 | 4,878 | 91.9 | 17.4 | 428 | 3,956 |
| Indiana | 7,560 | 74,196 | 6,146 | 61,983 | 83.5 | 68.8 | 12,213 | 10,970 |
| Iowa | 2,485 | 10,551 | 1,215 | 6,664 | 63.2 | 19.5 | 3,887 | 4,609 |
| Michigan | 226,614 | 738,489 | 196,766 | 636,682 | 86.2 | 35.0 | 101,807 | 378,171 |
| Minnesota | 105,158 | 307,436 | 73,706 | 216,724 | 70.5 | 15.4 | 90,712 | 169,527 |
| Ohio | 13,414 | 97,974 | 11,772 | 92,773 | 94.7 | 84.6 | 5,201 | 9,882 |
| Wisconsin | 287,325 | 1,065,942 | 246,571 | 889,325 | 83.4 | 45.3 | 176,617 | 406,424 |
| Total, Private | 644,078 | 2,299,894 | 537,033 | 1,909,029 | 83.0 | 40.2 | 390,865 | 983,539 |
| State, County, Municipal | | | | | | | | |
| Illinois | 1,672 | 7,761 | 1,670 | 7,663 | 98.7 | 31.9 | 98 | 5,187 |
| Indiana | 3,169 | 18,209 | 3,057 | 17,322 | 95.2 | 86.3 | 887 | 1,599 |
| Iowa | 627 | 3,818 | 626 | 3,798 | 99.5 | 5.2 | 20 | 3,599 |
| Michigan | 148,425 | 329,994 | 134,936 | 308,310 | 93.4 | 52.8 | 21,684 | 133,915 |
| Minnesota | 58,797 | 121,121 | 36,129 | 71,548 | 59.1 | 17.0 | 49,573 | 50,918 |
| Ohio | 8,787 | 33,693 | 7,181 | 29,562 | 87.7 | 63.6 | 4,131 | 8,125 |
| Wisconsin | 154,910 | 430,707 | 149,136 | 410,120 | 95.2 | 44.9 | 20,587 | 216,511 |
| Total, Non-
Fed. Public | 376,387 | 945,303 | 332,735 | 848,323 | 89.7 | 45.3 | 96,980 | 449,884 |
| Total, State,
Private | 4,020,465 | 3,245,197 | 869,768 | 2,757,352 | 85.0 | 44.7 | 487,845 | 1,403,423 |

Table 5. (cont'd.) Status of Control by Ownership Classes, North Central Region
on December 31, 1956 - Net Acres

| Forest or State | Total Acres | | Acres Initially Worked | | Percent Control Area | | Acres Control Area Requiring Initial Work | | Maintenance Rework once completed |
|--------------------------|-------------|--------------|------------------------|--------------|----------------------|----------------|---|-----------|-----------------------------------|
| | White Pine | Control Area | White Pine | Control Area | Initially Worked | On Maintenance | | | |
| | | | | | | | | | |
| National Forests | | | | | | | | | |
| Hoosier, Ind. | 18 | 179 | 18 | 179 | 100.0 | 100.0 | 0 | 0 | 0 |
| Wayne, Ohio | 515 | 4,029 | 515 | 4,029 | 100.0 | 100.0 | 0 | 0 | 4,015 |
| Huron, Mich. | 10,982 | 22,944 | 8,487 | 18,064 | 78.7 | 33.9 | 4,880 | 10,285 | 1,779 |
| Manistee, Mich. | 31,280 | 88,093 | 31,090 | 87,593 | 99.4 | 88.5 | 500 | 9,653 | 17,916 |
| Mianatha, Mich. | 15,224 | 39,584 | 14,964 | 38,824 | 98.1 | 83.7 | 760 | 5,678 | 23,111 |
| Marquette, Mich. | 11,702 | 25,720 | 11,702 | 25,720 | 100.0 | 81.4 | 0 | 4,778 | 20,912 |
| Ottawa, Mich. | 11,275 | 21,242 | 11,275 | 21,242 | 100.0 | 56.0 | 0 | 9,354 | 11,280 |
| Superior, Minn. | 34,075 | 48,757 | 27,457 | 37,707 | 77.3 | 32.4 | 11,050 | 21,901 | 15,808 |
| Chippewa, Minn. | 13,046 | 22,071 | 12,914 | 21,749 | 98.5 | 70.3 | 322 | 6,245 | 15,500 |
| Chequamegon, Wis. | 33,943 | 55,059 | 31,101 | 49,688 | 90.2 | 66.0 | 5,371 | 13,347 | 26,711 |
| Nicolet, Wis. | 13,183 | 25,646 | 13,183 | 25,646 | 100.0 | 70.2 | 0 | 7,608 | 18,038 |
| Total, National Forests | 175,243 | 353,324 | 162,706 | 330,441 | 93.5 | 68.4 | 22,883 | 88,849 | 203,291 |
| Indian Reservations | | | | | | | | | |
| Sac Fox, Iowa | 50 | 500 | 50 | 500 | 100.0 | 41.2 | 0 | 294 | 0 |
| Grand Portage, Minn. | 1,097 | 1,496 | 1,097 | 1,496 | 100.0 | 0.0 | 0 | 1,496 | 0 |
| Reech Lake, Minn. | 1,094 | 1,639 | 1,080 | 1,596 | 97.4 | 65.5 | 43 | 523 | 1,073 |
| Nett Lake, Minn. | 5,212 | 7,079 | 5,212 | 7,079 | 100.0 | 88.1 | 0 | 841 | 6,238 |
| Vermillion, Minn. | 78 | 186 | 78 | 186 | 100.0 | 100.0 | 0 | 0 | 0 |
| White Earth, Minn. | 502 | 1,056 | 502 | 1,056 | 100.0 | 51.6 | 0 | 511 | 545 |
| Red Lake, Minn. | 12,808 | 19,443 | 12,293 | 18,635 | 95.8 | 76.8 | 808 | 3,711 | 14,732 |
| Bad River, Wis. | 8,547 | 15,023 | 8,451 | 14,846 | 98.8 | 90.0 | 177 | 1,327 | 13,519 |
| One Court Oreilles, Wis. | 15,174 | 26,685 | 14,115 | 25,358 | 95.0 | 85.2 | 1,327 | 2,634 | 22,724 |
| Lac du Flambeau, Wis. | 14,411 | 26,001 | 14,411 | 26,001 | 100.0 | 100.0 | 0 | 0 | 26,000 |
| Monominee, Wis. | 25,085 | 41,912 | 23,902 | 39,627 | 94.5 | 60.8 | 2,285 | 14,157 | 25,470 |
| Total, Ind. Reservations | 84,058 | 141,020 | 81,191 | 136,380 | 96.7 | 78.6 | 4,640 | 25,494 | 25,080 |
| Total All Ownership | 1,279,766 | 3,739,541 | 1,113,665 | 3,221,173 | 86.2 | 45.6 | 55,368 | 1,517,766 | 1,706,401 |

Table 6. Current and Cumulative Canker Pruning, North Central Region. From Inception to December 31, 1956

| State | Ownership Class | No. of Areas Treated | No. of Trees Examined | No. of Trees Removed | No. of Trees Treated | No. of Cankers Removed | Man. Hr. Used |
|--------------------|-----------------|----------------------|-----------------------|----------------------|----------------------|------------------------|---------------|
| Calendar Year 1956 | | | | | | | |
| Iowa | State Forest | 5 | 9,450 | 295 | 148 | 212 | 14 |
| | State & Private | 19 | 11,000 | - | 1,482 | 3,172 | 100 |
| Mich. | Ottawa N. F. | 1 | 5,300 | 500 | 700 | 2,200 | 39 |
| | Total | 20 | 16,300 | 500 | 2,182 | 5,372 | 153 |
| Minn. | State & Private | 10 | 6,277 | 46 | 252 | 346 | 15 |
| | Private | 1 | 3,055 | 25 | 3,005* | 1,000 | 30 |
| Wis. | U.S. For. Serv. | 1 | 4,010 | 200 | 1,006 | 1,808 | 10 |
| | Total | 2 | 7,065 | 225 | 4,011 | 2,808 | 40 |
| Region Totals | | 37 | 39,092 | 1,066 | 6,593 | 8,738 | 263 |

* Includes some trees without visible cankers where lower branches were pruned to reduce chance for infection

Cumulative to December 31, 1956

| | | | | | | | |
|---------------|-----|-----|-----------|--------|---------|---------|-------|
| Indiana | All | 4 | 973 | 0 | 8 | 11 | 1 |
| Iowa | All | 90 | 77,092 | 1,224 | 1,176 | 2,585 | 123 |
| Michigan | All | 402 | 873,176 | 2,320 | 62,031 | 125,098 | 4,099 |
| Minnesota | All | 211 | 561,250 | 8,500 | 55,167 | 92,922 | 2,365 |
| Ohio | All | 5 | 1,306 | 13 | 44 | 126 | 15 |
| Wisconsin | All | 24 | 458,530 | 6,174 | 38,595 | 48,301 | 665 |
| Region Totals | | 736 | 1,972,327 | 18,231 | 157,021 | 269,043 | 7,269 |

Table 7. Nursery Sanitation Performed, North Central Region, 1956 (All in Wisconsin)

| White Pine
Trees in | | | | | | |
|--------------------------------------|--------------------|----------------------|--------------------|-----------------|--------------------|------------------|
| Name of Nursery
(All State-owned) | Nursery
Working | Acres
(Thousands) | Acres
Protected | Acres
Worked | Ribes
Destroyed | Man. Hr.
Used |
| Boscobel | Fourth | 2,500 | 130 | 600 | 30 | 1 |
| Gordon | Thirteenth | 570 | 35 | 373 | 62 | 30 |
| Hayward | Thirteenth | 1,500 | 100 | 552 | 384 | 61 |
| Total | | 4,570 | 265 | 1,525 | 476 | 155 |

Table 8. Approximate Number of Man-Months Employed by Months, Agencies and States
North Central Region, Calendar Year 1956

| Agency | Number of Man-Months | | | | | | | | | | | | Total | Per Cent |
|------------------|----------------------|------|-------|-------|------|------|------|------|-------|------|------|------|-------|----------|
| | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | | |
| Illinois | | | | | | | | | | | | | | |
| State & Private | 1.0 | 1.0 | 4.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 | 1.0 | 29.0 | |
| F.S.-432 | - | - | 1.0 | 1.0 | - | - | - | - | - | - | - | - | 2.0 | |
| Total | 1.0 | 1.0 | 5.0 | 5.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 | 1.0 | 31.0 | |
| Iowa | | | | | | | | | | | | | | |
| State & Private | - | 1.0 | 0.4 | - | - | 0.8 | 4.5 | 1.3 | - | - | - | 0.2 | 8.2 | |
| F.S.-712 | - | - | - | - | - | - | - | - | - | - | - | 0.5 | 0.5 | |
| F.S.-432 | 1.0 | 1.0 | - | - | - | 0.5 | 1.0 | 1.0 | - | 0.3 | - | 0.7 | 5.5 | |
| Total | 1.0 | 2.0 | 0.4 | - | - | 1.3 | 5.5 | 2.3 | - | 0.3 | - | 1.4 | 14.2 | |
| Michigan | | | | | | | | | | | | | | |
| State & Private | 1.0 | 1.0 | 1.0 | 4.0 | 14.0 | 25.0 | 25.4 | 26.0 | 19.1 | 5.1 | 3.0 | 1.0 | 125.6 | |
| F.S.-712 | 3.1 | 3.1 | 1.1 | 1.1 | 1.1 | 1.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.4 | 2.5 | 23.5 | |
| F.S.-432 | - | - | 1.0 | 1.8 | 5.0 | 5.5 | 6.0 | 6.0 | 5.0 | 2.0 | 1.4 | 1.0 | 34.7 | |
| National Forests | - | - | - | 0.1 | 8.2 | 13.7 | 8.9 | 7.1 | 2.5 | 0.3 | - | - | 40.8 | |
| Total | 4.1 | 4.1 | 3.1 | 7.0 | 28.3 | 45.3 | 42.3 | 41.1 | 28.6 | 9.4 | 6.8 | 4.5 | 224.6 | |
| Minnesota | | | | | | | | | | | | | | |
| State & Private | - | - | - | - | 10.3 | 15.6 | 19.0 | 10.2 | 1.3 | - | - | - | 56.4 | |
| F.S.-712 | 2.7 | 3.3 | 3.2 | 3.0 | 1.5 | 2.3 | 3.0 | 3.0 | 3.0 | 3.2 | 3.2 | 2.7 | 34.1 | |
| F.S.-432 | - | - | - | 0.9 | 4.9 | 7.2 | 4.4 | 5.3 | 2.9 | 1.6 | 1.0 | 0.9 | 29.1 | |
| National Forests | 0.5 | - | - | - | 9.6 | 9.1 | 51.7 | 32.1 | 1.5 | - | - | - | 104.5 | |
| Indian Service | - | - | - | - | 10.2 | 22.6 | 1.9 | 16.0 | - | - | - | - | 50.7 | |
| Total | 3.2 | 3.3 | 3.2 | 3.9 | 36.5 | 56.8 | 80.0 | 66.6 | 8.7 | 4.8 | 4.2 | 3.6 | 274.8 | |

Table 8. (cont'd.) Approximate Number of Man-Months Employed by Months, Agencies and States, North Central Region, Calendar Year 1955

| Agency | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|----------------------|------|------|-------|-------|-------|-------|-------|-------|-------|------|------|------|--------|
| Number of Man-Months | | | | | | | | | | | | | |
| Ohio | | | | | | | | | | | | | |
| State & Private | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | - | - | - | - | 0.9 |
| U.S.-712 | - | - | - | - | - | - | 1.0 | 1.0 | 0.2 | - | - | - | 2.2 |
| U.S.-432 | - | - | 1.0 | 0.8 | - | - | - | - | - | - | - | - | 1.8 |
| Total | 0.1 | 0.1 | 1.1 | 0.9 | 0.1 | 0.2 | 1.1 | 1.1 | 0.2 | - | - | - | 4.9 |
| Wisconsin | | | | | | | | | | | | | |
| State & Private | 2.0 | 2.0 | 2.0 | 8.0 | 33.6 | 68.0 | 50.1 | 52.3 | 18.0 | 16.1 | 18.3 | 3.0 | 273.4 |
| U.S.-712 | 4.0 | 4.0 | 4.0 | 3.7 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 38.7 |
| U.S.-432 | - | - | - | 2.3 | 4.2 | 19.8 | 11.0 | 7.2 | 3.0 | 1.2 | - | - | 48.7 |
| National Forests | - | - | 1.0 | 1.0 | 9.2 | 18.8 | 21.0 | 23.7 | 12.0 | 6.0 | 1.0 | - | 93.7 |
| Indian Service | - | - | - | 2.0 | 17.5 | 27.3 | 21.0 | 13.0 | 9.0 | 1.0 | 1.0 | - | 90.8 |
| Total | 6.0 | 6.0 | 7.0 | 16.0 | 67.5 | 135.9 | 106.1 | 99.2 | 45.0 | 27.3 | 23.3 | 6.0 | 545.3 |
| Regional Office | | | | | | | | | | | | | |
| U.S.-712 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 30.0 |
| State & Private | 4.1 | 5.1 | 7.5 | 16.1 | 61.0 | 112.6 | 102.1 | 92.9 | 41.4 | 23.2 | 22.3 | 5.2 | 493.5 |
| U.S.-712 | 11.8 | 12.4 | 10.3 | 10.8 | 8.6 | 8.4 | 12.0 | 12.0 | 11.2 | 10.2 | 10.6 | 10.7 | 129.0 |
| U.S.-432 | 1.0 | 1.0 | 3.0 | 6.8 | 14.1 | 33.0 | 22.4 | 19.5 | 10.9 | 5.1 | 2.4 | 2.6 | 120.0 |
| National Forests | 0.5 | - | 1.0 | 1.0 | 27.0 | 41.6 | 81.6 | 62.9 | 16.0 | 6.3 | 1.0 | - | 239.0 |
| Indian Service | - | - | - | 1.0 | 27.7 | 49.9 | 22.9 | 29.0 | 9.0 | 1.0 | 1.0 | - | 141.5 |
| Region Total | 17.4 | 18.5 | 21.8 | 35.8 | 138.4 | 245.5 | 241.0 | 216.3 | 86.5 | 45.8 | 37.3 | 18.5 | 1124.0 |

Table 9. Expenditures, North Central Region, by States and Sources, Calendar Year 1956

| Source of Funds | Regional | | | | | |
|---------------------|----------|--------|----------|-----------|--------|-----------|
| | Illinois | Iowa | Michigan | Minnesota | Ohio | Wisconsin |
| State Indirect Aid | | | | | | |
| January-June | \$ 210 | \$ 460 | \$ 675 | \$ 1,750 | \$ 432 | \$ 8,100 |
| July-December | 210 | 480 | 675 | 1,650 | 432 | 8,100 |
| Sub-Total, State | 420 | 940 | 1,350 | 3,400 | 864 | 16,200 |
| State Direct Aid | | | | | | |
| January-June | 7,759 | 175 | 15,084 | 4,968 | 375 | 19,164 |
| July-December | 6,305 | 1,085 | 19,468 | 9,611 | 300 | 34,333 |
| Sub-Total, State | 14,064 | 2,200 | 34,552 | 14,579 | 675 | 53,497 |
| Forest Service, 712 | | | | | | |
| January-June | 337 | 104 | 5,520 | 3,483 | 526 | 10,081 |
| July-December | 323 | 617 | 8,011 | 11,263 | 997 | 11,104 |
| Sub-Total, State | 660 | 721 | 13,531 | 14,746 | 1,523 | 21,185 |
| Forest Service, 432 | | | | | | |
| January-June | 1,351 | 1,006 | 12,492 | 6,721 | 1,009 | 11,031 |
| July-December | - | 976 | 9,539 | 4,820 | 292 | 6,648 |
| Sub-Total, State | 1,351 | 2,006 | 22,031 | 11,541 | 1,301 | 17,679 |
| National Forests | | | | | | |
| January-June | - | - | 9,953 | 4,706 | - | 5,746 |
| July-December | - | - | 4,130 | 32,303 | - | 15,106 |
| Sub-Total, Federal | - | - | 14,083 | 37,009 | - | 20,852 |
| Indian Service | | | | | | |
| January-June | - | - | - | 8,650 | - | 8,428 |
| July-December | - | - | - | 4,145 | - | 5,507 |
| Sub-Total, Federal | - | - | - | 12,795 | - | 13,935 |
| All Funds | | | | | | |
| Sub-Total, Federal | 2,011 | 2,703 | 49,645 | 81,091 | 2,824 | 73,651 |
| January-June | 9,657 | 1,745 | 43,724 | 35,278 | 2,342 | 62,550 |
| July-December | 6,838 | 3,158 | 41,823 | 63,792 | 2,021 | 80,798 |
| Grand Total | 16,495 | 4,803 | 85,547 | 99,070 | 4,363 | 143,348 |
| Sub-Total, Federal | 2,011 | 2,703 | 49,645 | 81,091 | 2,824 | 73,651 |
| January-June | 9,657 | 1,745 | 43,724 | 35,278 | 2,342 | 62,550 |
| July-December | 6,838 | 3,158 | 41,823 | 63,792 | 2,021 | 80,798 |
| Grand Total | 16,495 | 4,803 | 85,547 | 99,070 | 4,363 | 143,348 |

Table 9A. North Central Region Expenditures, by State and Activity, Calendar Year 1956

| State | Program | | | | | | | Total |
|-----------------|-----------|-------------------|-------------------|--------------------|----------------|-----------------|--------------------|-----------|
| | Planning | Surveys, Checking | Ribes Eradication | Nursery Protection | Canker Pruning | Methods Studies | Education- al Work | |
| Illinois | \$ 2,112 | \$ 600 | \$ 10,750 | \$ - | \$ 34 | \$ 774 | \$ 2,225 | \$ 16,195 |
| Iowa | 1,190 | 150 | 2,714 | 300 | 374 | - | 175 | 4,903 |
| Michigan | 6,881 | 6,950 | 69,036 | - | 1,880 | - | 800 | 85,547 |
| Minnesota | 9,990 | 9,816 | 72,120 | 400 | 372 | 4,346 | 2,026 | 99,070 |
| Ohio | 860 | 1,809 | 590 | 504 | - | - | 600 | 4,263 |
| Wisconsin | 7,400 | 8,927 | 103,558 | 1,134 | 134 | 19,795 | 2,400 | 143,346 |
| Regional Office | 28,537(a) | 1,000 | - | - | - | 5,000 | 1,000 | 35,537 |
| Total | 56,970 | 29,252 | 258,768 | 2,338 | 2,794 | 29,915 | 9,226 | 389,263 |

(a) Includes Common Service Costs

Table 9B. North Central Region Expenditures, by Source of Funds and Activity, Calendar Year 1956

| Source of Funds | Program | | | | | | | Total |
|---------------------|----------|-------------------|-------------------|--------------------|----------------|-----------------|--------------------|-----------|
| | Planning | Surveys, Checking | Ribes Eradication | Nursery Protection | Canker Pruning | Methods Studies | Education- al Work | |
| State, Indirect Aid | \$ 7,570 | \$ - | \$ - | \$ 1,204 | \$ - | \$ 14,400 | \$ - | \$ 23,174 |
| State, Direct Aid | 1,052 | 8,765 | 97,952 | 1,064 | 1,589 | 4,380 | 3,825 | 118,627 |
| U.S.-712 | 40,566 | 11,848 | 16,608 | 70 | 494 | 10,397 | 5,198 | 85,183 |
| U.S.-432 | 1,682 | 5,103 | 49,625 | - | 577 | 317 | 203 | 57,507 |
| National Forests | 6,100 | 3,536 | 67,853 | - | 134 | 421 | - | 78,044 |
| Indian Service | - | - | 26,730 | - | - | - | - | 26,730 |
| Total | 56,970 | 29,252 | 258,768 | 2,338 | 2,794 | 29,915 | 9,226 | 389,263 |

Source: Bureau of Reclamation, Washington, D.C.

